ORDER NO. ARD81040045C8-20

Service Manual

Cassette Deck

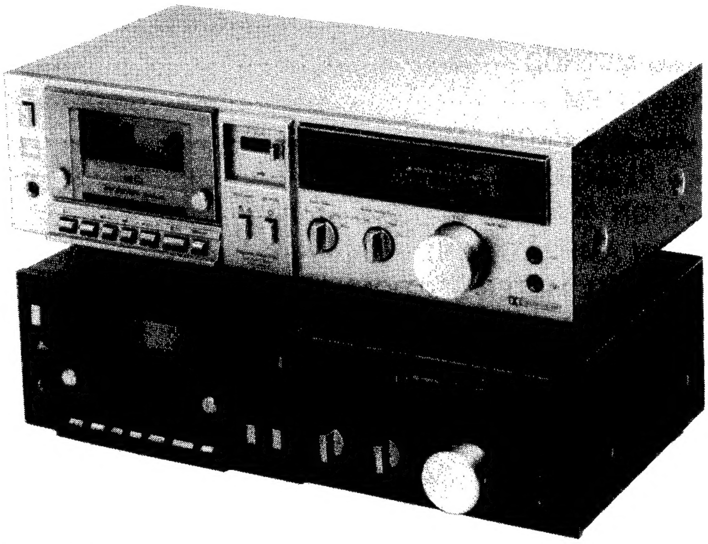
RS-M240X

(Silver Face
Black Face)

dbx Equipped Stereo Cassette Deck
with Soft-Touch Controls and
Peak Hold FL Meters

DOLBY SYSTEM

This is the Service Manual for the following areas.
- [D] ········· For all European areas except United Kingdom.
- [N] ········· For Asia, Latin America, Middle East and Africa areas.
- [A] ········· For Australia.



RS-M24 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	
Tape speed:	4.8 cm/s	
Wow and flutter:	0.048% (WRMS), ±0.14% (DIN)	
Frequency response:	Metal tape;	20—18,000 Hz
		30—17,000 Hz (DIN)
		30—16,000 Hz ±3 dB
	CrO_2 tape;	20—18,000 Hz
		30—16,000 Hz (DIN)
		30—16,000 Hz ±3 dB
	Normal tape;	20—17,000 Hz
		30—15,000 Hz (DIN)
		30—14,000 Hz ±3 dB
Dynamic range:	dbx* in; 110 dB (at 1 kHz)	
Max. input level:	10 dB or more improved with dbx in (at 1 kHz)	
Signal-to-noise ratio:	dbx in; 91 dB	
	Dolby** NR in; 67 dB (above 5 kHz)	
	Dolby NR out; 57 dB (signal level=peak level a weighted, CrO_2 type tape)	
Fast forward and rewind time:	Approx. 90 seconds with C-60 cassette tape	

Inputs:	MIC; sensitivity 0.25 mV, input impedance 47 kΩ applicable microphone impedance 400Ω—10 kΩ
	LINE; sensitivity 60 mV, input impedance 47 kΩ
Outputs:	LINE; output level 400 mV, output impedance 1.5 kΩ or less, load impedance 22 kΩ over
	HEADPHONES; output level 80 mV, load impedance 8Ω
Bias frequency:	80 kHz
Motor:	Electronically controlled DC motor
Heads:	2-head system
	1-SX head for record/playback
	1-double-gap ferrite head for erasure
Power requirement:	AC; 110/125/220/240 V, 50-60 Hz
Preset power voltage:	[D]······ 220 V
	[A]······ 240 V
Power consumption:	[D][A] ··· 15 W
	[N]······ 13 W
Dimensions:	43.0 cm(W)×11.9 cm(H)×24.6 cm (D)
Weight:	4.6 kg

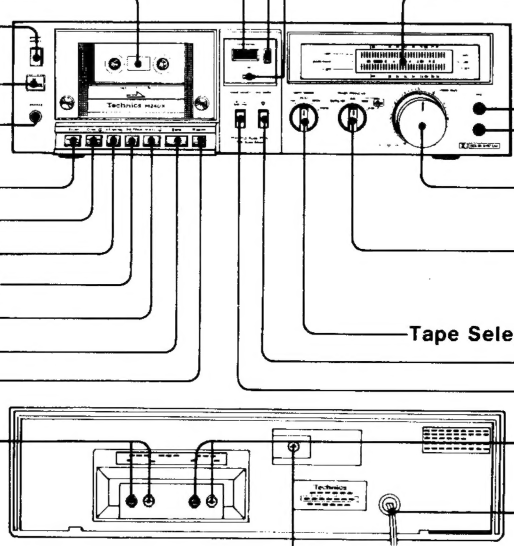
Specifications are subject to change without notice.
* The term dbx is a registered trademark of dbx Inc.
** 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

Technics

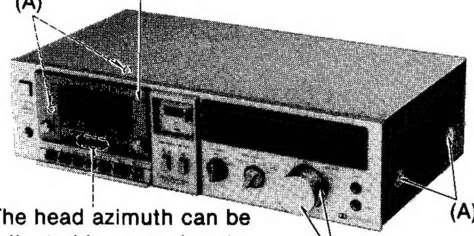
Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

CONTENTS

LOCATION OF CONTROLS AND COMPONENTS



DISASSEMBLY INSTRUCTIONS



* The head azimuth can be adjusted by removing the cassette lid.

Fig. 1

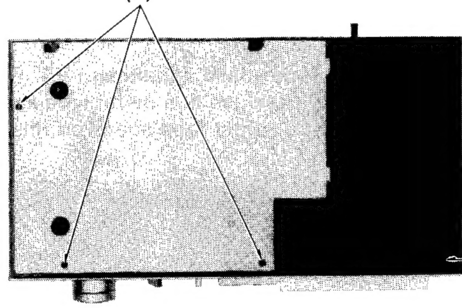


Fig. 2

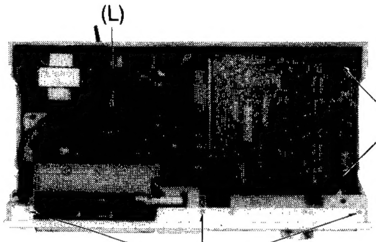


Fig. 3

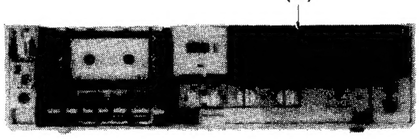


Fig. 4

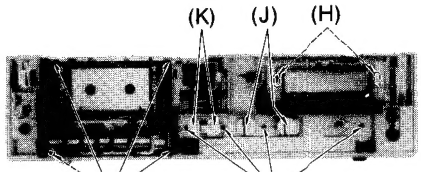


Fig. 5

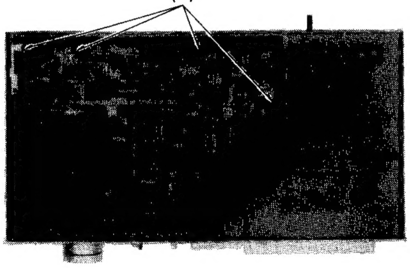


Fig. 6

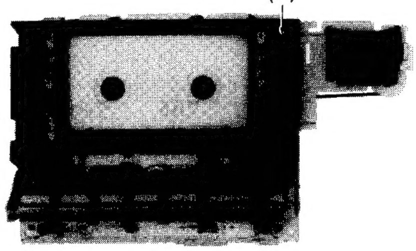


Fig. 7

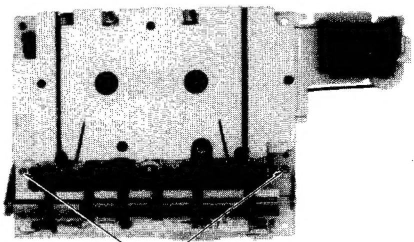


Fig. 8

Ref. No.	Procedure	To remove ——	Remove ——.	Shown in fig. ——.
1	1	Case cover	• 4 screws ···························· (A)	1
2	2	Bottom cover	• 3 screws ···························· (B)	2
3	1→3	dbx circuit board	• 2 red screws························ (C)	3
4	1→2→4	Front panel	• Cassette lid ························ (D) • 2 volume knobs ···················· (E) • 4 screws ···························· (F)	1 1 2, 3
5	1→2→4→5	FL meter	• Meter cover ························ (G) • 2 meter holders ···················· (H)	4 5
6	1→2→3→4→6	Main circuit board	• 8 red screws························ (I) • 2 select knobs ····················· (J) • 2 push buttons ····················· (K) • Recording wire ····················· (L)	5, 6 5 5 3
7	1→2→4→7	Mechanism unit	• 4 red screws························ (M)	5
8	1→2→4→7→8	Operation button unit	• Cassette holder····················· (N) • 2 screws ···························· (O)	7 8

MEASUREMENT AND ADJUSTMENT METHODS
(WITHOUT dbx SYSTEM)

• CIRCUIT BOARDS AND ADJUSTMENT PARTS LOCATION

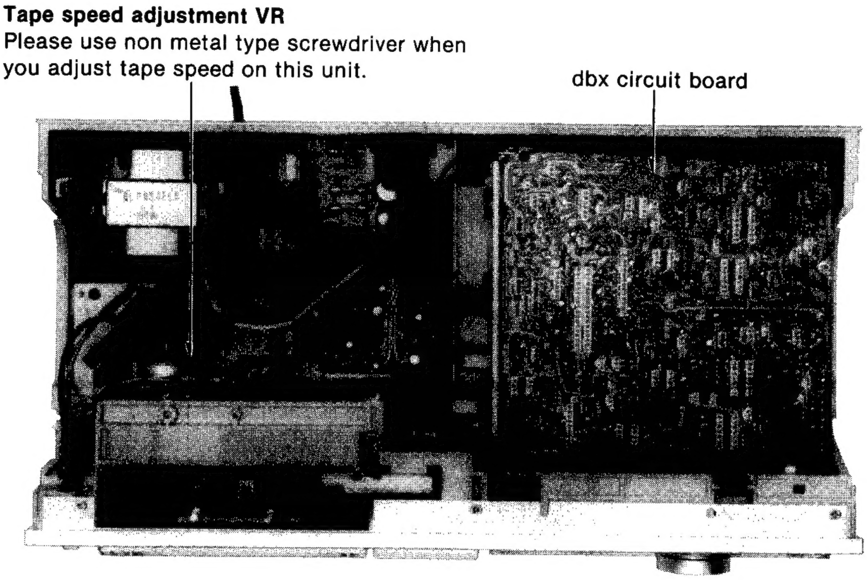


Fig. 1

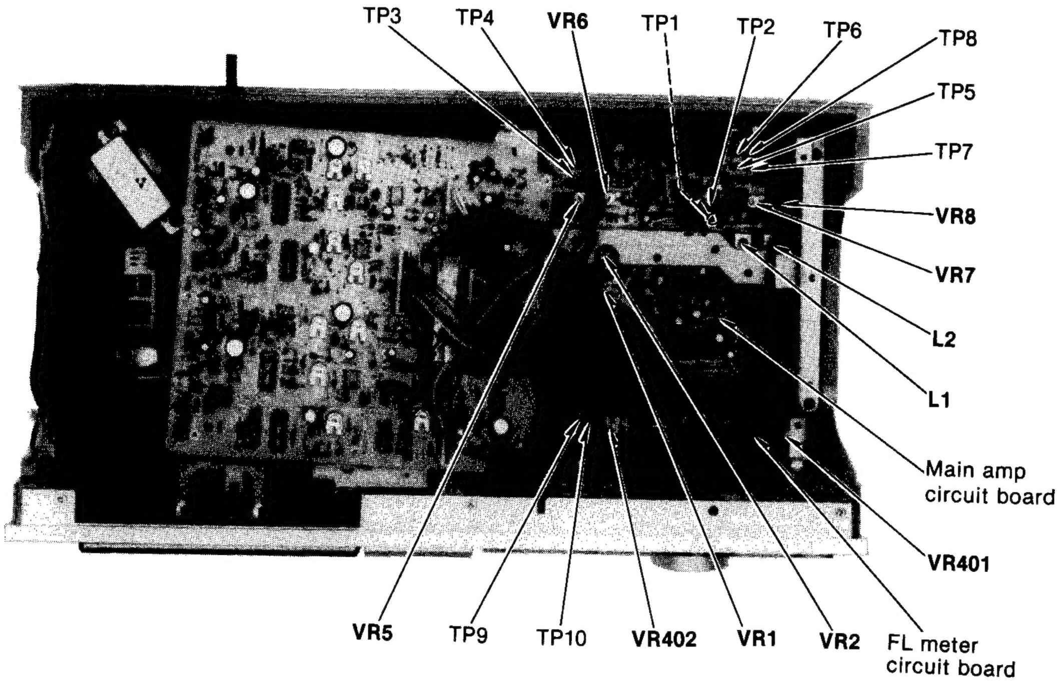
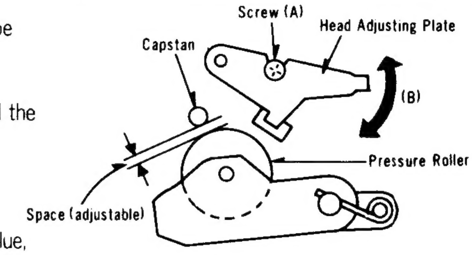
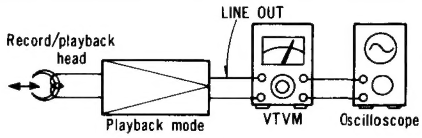
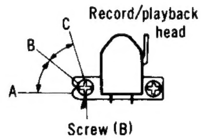
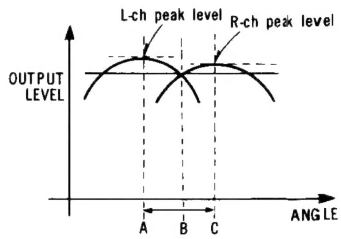
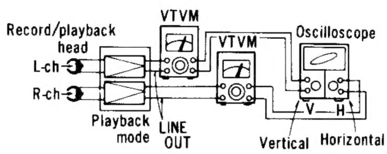
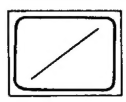
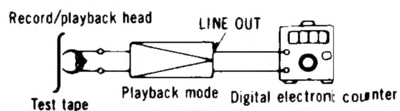


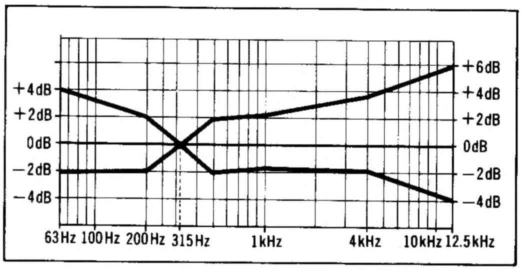
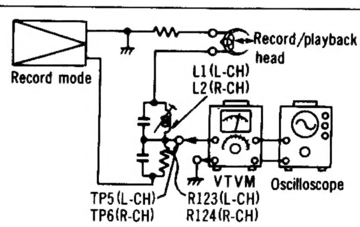
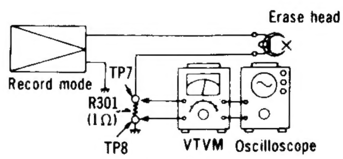
Fig. 2

• MEASUREMENT AND ADJUSTMENT METHODS

NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Make sure heads are clean.
- Make sure capstan and pressure roller are clean.
- Judgeable room temperature: 20±5°C (68±9°F)
- NR switch: OUT
- Tape selector: Normal position
- Input selector: Line in
- Input level controls: Maximum

ITEM	MEASUREMENT & ADJUSTMENT
Ⓐ Head position adjustment Condition: * Playback and pause mode	(The head adjusting plate is provided to adjust the tape touch of the head in cue or review mode.) 1. Press the playback button and pause button. 2. Measure the space between the pressure roller and the capstan. **Standard value: 0.5±0.3mm** 3. If the measured value is not within the standard value, untighten screw (A), and slide the head adjusting plate in the direction of arrow (B) for adjustment.  **Fig. 3**
Ⓑ Head azimuth adjustment Condition: * Playback mode Equipment: * VTVM * Oscilloscope * Test tape (azimuth) ···QZZCFM	**L-ch/R-ch output balance adjustment** 1. Make connections as shown in fig. 4.  **Fig. 4** 2. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) in fig. 5 for maximum output L-ch and R-ch levels. When the output levels of L-ch and R-ch are not at maximum at the same time, readjust as follows. 3. Turn the screw shown in fig. 5 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate the angle B between angles A and C, i.e., a point where L-ch and R-ch output levels come together at maximum. (Refer to figs. 5 and 6.)  **Fig. 5**  **Fig. 6** **L-ch/R-ch phase adjustment** 4. Make connections as shown in fig. 7. 5. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) shown in fig. 5 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 8 is obtained on the oscilloscope.  **Fig. 7**  **Fig. 8**
Ⓒ Tape speed Condition: * Playback mode Equipment: * Digital electronic counter or frequency counter * Test tape···QZZCWAT	**Tape speed accuracy** 1. Test equipment connection is shown in fig. 9. 2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter. 3. Take measurement at middle section of tape. 4. Measure this frequency. 5. On the basis of 3,000Hz, determine value by following formula:  **Fig. 9** $\text{Tape speed accuracy} = \frac{f-3{,}000}{3{,}000} \times 100\ (\%)$ where, f = measured value **Standard value: ±1.5%** **Adjustment method** 1. Playback the test tape (middle). 2. Adjust so that frequency becomes 3,000Hz. 3. Tape speed adjustment VR shown in fig. 1.

ITEM	MEASUREMENT & ADJUSTMENT
	Tape speed fluctuation Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $$\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3{,}000} \times 100\,(\%) \quad f_1 = \text{maximum value},\ f_2 = \text{minimum value}$$ **Standard value: Less than 1%** **Note:** Please use non metal type screwdriver when you adjust tape speed accuracy on this unit.
D Playback frequency response Condition: • Playback mode • Tape selector ···Normal position Equipment: • VTVM • Oscilloscope • Test tape···QZZCFM	1. Test equipment connection is shown in fig. 4. 2. Place UNIT into playback mode. 3. Playback the frequency response test tape (QZZCFM). 4. Measure output level at 315 Hz, 12.5 kHz, 8 kHz, 4 kHz, 1 kHz, 250 Hz, 125 Hz and 63 Hz, and compare each output level with the standard frequency 315 Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart (shown in fig. 10). **Playback frequency response chart**  **Fig. 10**
E Playback gain Condition: • Playback mode • Tape selector ···Normal position Equipment: • VTVM • Oscilloscope • Test tape···QZZCFM	1. Test equipment connection is shown in fig. 4. 2. Playback standard recording level portion on test tape (QZZCFM 315 Hz), and using VTVM measure the output level at LINE OUT. 3. Make measurement for both channels. **Standard value: 0.42 V±2 dB** **[around 0.42 V: at test points TP3 (L-CH) and TP4 (R-CH)]** **Adjustment** 1. If measured value is not within standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 2 on page 3). 2. After adjustment, check "Playback frequency response" again.
F Bias leakage Condition: • Record mode • Input level controls···MAX • Tape selector ···Metal position Equipment: • VTVM • Oscilloscope	1. Test equipment connection is shown in fig. 11. 2. Press the record and playback buttons. 3. Adjust trap coils L1 (L-CH), L2 (R-CH), so that measured value becomes minimum. 4. Make adjustment for both channels.  **Fig. 11**
G Erase current Condition: • Record mode • Tape selector ···Metal position Equipment: • VTVM • Oscilloscope	1. Test equipment connection is shown in fig. 12. 2. Press the record and pause buttons. 3. Set the tape selector to metal position. 4. Read voltage on VTVM and calculate erase current by following formula: $$\text{Erase current (A)} = \frac{\text{Voltage across both ends of R301}}{1\,(\Omega)}$$  **Fig. 12** **Standard value: 155±15 mA (Metal position)** 5. If measured value is not within standard, adjust as follows. **Adjustment** 1. Open the point (A) and short the point (B) on the main circuit board in the circuit board diagram (See page 16). 2. Make measurement for erase current. 3. Make sure that the measured value is within the erase current of 140 mA to 170 mA. 4. If it is beyond the value, carry out the following adjustments: • If the erase current is less than 140 mA, short the point (A). • If the erase current is more than 170 mA, open the points (A) and (B).

ITEM	MEASUREMENT & ADJUSTMENT

H Overall frequency response

Condition:

* Record/playback mode
* Tape selector
  ··· Normal position
  ··· CrO_2 position
  ··· Fe-Cr position
  ··· Metal position
* Input level controls ··· MAX

Equipment:

* VTVM
* AF oscillator
* ATT
* Oscilloscope
* Resistor (600 Ω)
* Test tape (reference blank tape)
  ··· QZZCRA for Normal
  ··· QZZCRX for CrO_2
  ··· QZZCRY for Fe-Cr
  ··· QZZCRZ for Metal

Note 1:
Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).

Note 2:
Test tape QZZCRA to be supplied after July 1980 has higher recording sensitivity in the middle and high frequency range.

Overall frequency response chart (Normal)

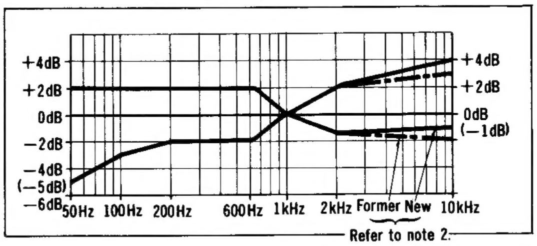
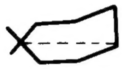


Fig. 13

*  This chart indicates the standard values for the new type of QZZCRA when in use.
*  This chart indicates the standard values for the former type of QZZCRA when in use.

The new type of QZZCRA is marked as shown in fig. 14.

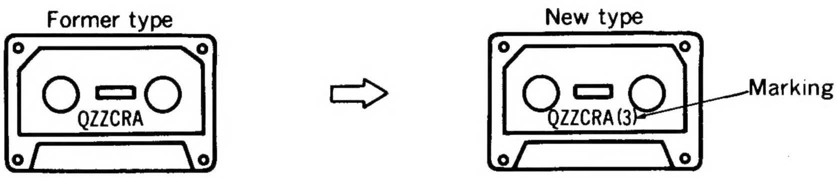


Fig. 14

Overall frequency response adjustment by recording bias current

Note 1:
On RS-M240X, overall frequency response is adjusted with tape selector set at Normal.

Note 2:
Recording equalizer is fixed.

1. Make connections as shown in fig. 15.
2. Input a 1 kHz, −24 dB signal through LINE IN.
   Place the set in record mode.
3. Fine adjust the attenuator to obtain 0.42 V LINE OUT output.
   * Make sure that the input signal level is −24 ± 4 dB with 0.42 V output voltage.

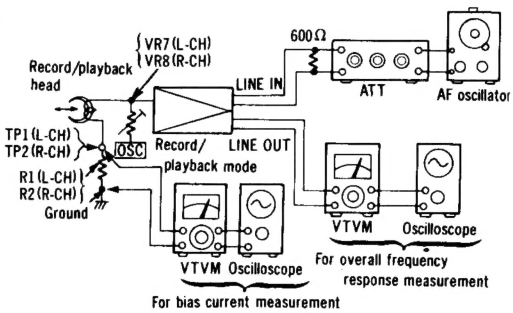


Fig. 15

4. Set the tape selector to Normal, and load the test tape (QZZCRA).
5. Adjust the attenuator to reduce the input signal level by 20 dB.
6. Adjust the AF oscillator to generate 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz and 10 kHz signals, and record these signals on the test tape.
7. Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for Normal tapes (fig. 13).
   (If the curve is within the charted specifications, proceed to steps 8, 9 and 10.)
   If the curve is not within the charted specifications, adjust as follows;

Adjustment Ⓐ:
When the curve exceeds the overall frequency response chart specifications (fig. 13) as shown in fig. 16.

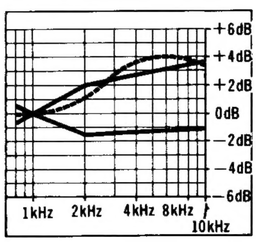


Fig. 16

Adjustment Ⓑ:
When the curve falls below the overall frequency response chart specifications (fig. 13) as shown in fig. 17.

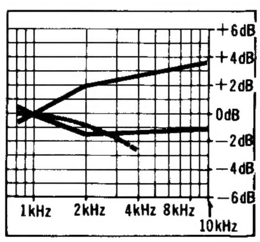


Fig. 17

ITEM	MEASUREMENT & ADJUSTMENT

1) Increase bias current by turning VR7 (L-CH) and VR8 (R-CH).
(See fig. 2 on page 3.)
2) Repeat steps 6 and 7 to confirm.
(Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 13).
3) If the curve still exceeds the specifications (fig. 13), increase bias current further and repeat steps 6 and 7.

1) Reduce bias current by turning VR7 (L-CH) and VR8 (R-CH).
2) Repeat steps 6 and 7 to confirm.
(Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 13.)
3) If the curve still falls below the charted specifications (fig. 13), reduce bias current further and repeat steps 6 and 7.

8. Switch the tape selector to CrO_2, change test tape to QZZCRX, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO_2 tapes (fig. 18).

9. Switch the tape selector to Fe-Cr, change test tape to QZZCRY, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for Fe-Cr tapes (fig. 18).

Overall frequency response chart (CrO_2, Fe-Cr, Metal)

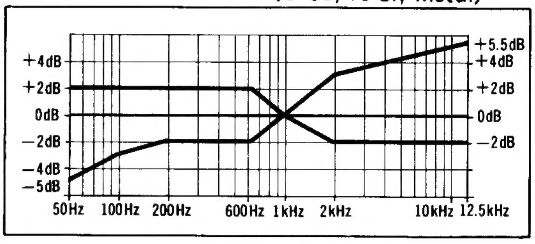


Fig. 18

10. Switch the tape selector to Metal, change test tape to QZZCRZ, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for Metal tapes (fig. 18).

11. Confirm that bias currents are approximately as follows when the tape selector is set at different positions.
* Read voltage on VTVM and calculate bias current by following formula:

$$\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10\ (\Omega)}$$

around 410 μA (Normal position)
around 440 μA (Fe-Cr position)
around 545 μA (CrO_2 position)
around 800 μA (Metal position)
: measured at TP1 (L-CH) and TP2 (R-CH)

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❶ Overall gain

Condition:
* Record/playback mode
* Input level controls ··· MAX
* Standard input level;
  MIC ········ −72 ± 4 dB
  LINE IN ··· −24 ± 4 dB

Equipment:
* VTVM * AF oscillator
* ATT * Oscilloscope
* Resistor (600 Ω)
* Test tape
  (reference blank tape)
  ··· QZZCRA for Normal

1. Test equipment connection is shown in fig. 19.
2. Place UNIT into record mode, and tape selector to Normal position.
3. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT to LINE IN.
4. Adjust ATT until monitor level at LINE OUT becomes 0.42 V.
5. Using test tape, make recording.
6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.42 V.
7. If measured value is not 0.42 V, adjust VR5 (L-CH), VR6 (R-CH) (See fig. 2).
8. Repeat from step 2.

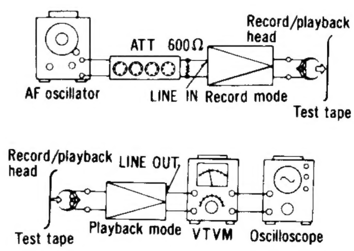

Fig. 19

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❸ Fluorescent meter

Condition:
* Record mode
* Input level controls ··· MAX
* Tape selector
  ··· Normal position

1. Test equipment connection is shown in fig. 19.
2. As shown in fig. 20, connecting the base of Q402 and ground stops the oscillation of the astable multivibrator comprising Q402 and Q403.
3. Supply 1 kHz signal (−24 dB) to the LINE IN jack, then press the record button.
4. Adjust the ATT so that the output level at LINE OUT jack becomes 0.42 V (The input level at this condition is termed the standard input level).

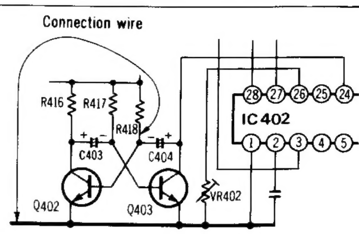
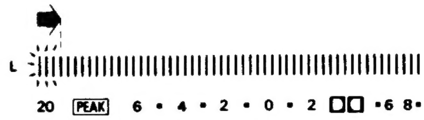
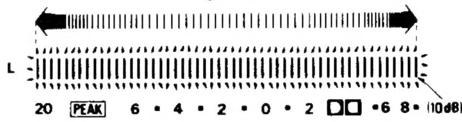
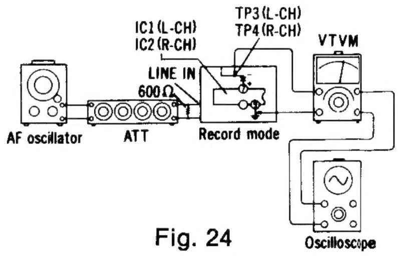


Fig. 20

ITEM	MEASUREMENT & ADJUSTMENT
Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω)	5. Adjustment at "−20 dB": A. Adjust the ATT so that input level is −20 dB below standard recording level. B. Adjust VR401 so that the −20 dB segment lights up in the −20±0.8 dB range (L-CH ONLY) (See fig. 22) 6. Adjustment at "0 dB": A. Adjust the ATT so that the output level at LINE OUT jack becomes 0.42 V. (The input level at this condition is termed the standard input level.) B. Adjust VR402 so that the +1 dB segment lights up in the 0±0.2 dB range of the standard input level (See fig. 22). 7. Repeat twice between steps 5 and 6 above. 8. Adjust ATT and check that all segments light up when an input signal level is increased to 10 dB higher than the standard input level (See fig. 23).  Fig. 21  Fig. 22  Fig. 23
Ⓚ Dolby NR circuit Condition: * Record mode * NR switch ··· Dolby IN/OUT * Input level controls ··· MAX Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω)	1. Test equipment connection is shown in fig. 24. 2. Place UNIT into record mode, set the NR switch to OUT position and supply to LINE IN to obtain −35 dB (17.5 mV) at TP3 (L-CH), TP4 (R-CH) (frequency 5 kHz). 3. Confirm that the value at Dolby IN position is 8±2.5 dB greater than the value at Dolby OUT position of NR switch.  Fig. 24

OUTLINE OF dbx SYSTEM

In 1971, the dbx company of Massachusetts, U.S.A., succeeded in developing a logarithmic compression/expansion system for audio signals which extends across an extremely wide amplitude range and results in a very low distortion rate.
In this system, the dynamic range of the input signal is compressed to 1/2 its original level (measured in decibels), and then recorded. The recorded signal is then expanded (2x) prior to playback, in order to restore it to the original level. By this process, a dynamic range exceeding 100dB can be easily obtained by using an ordinary tape recorder.
This system is referred to as a decilinear noise reduction system, but is generally called the "dbx system", the name being derived from the dbx company.

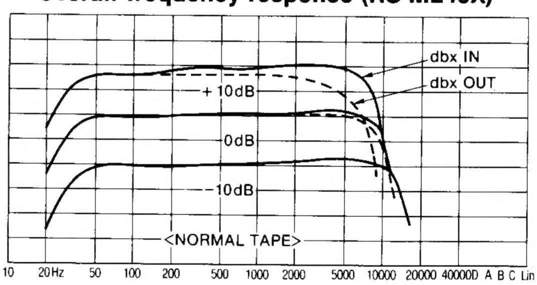
• The features of the dbx system

1. A significant noise reduction (approximately 30dB or more) is obtained over the entire audible frequency range.

Noise reduction mode	S/N ratio RS-M240X	Remarks
Noise reduction "OUT"	58dB	CrO_2 tape, peak level
Dolby NR "IN"	66dB	CrO_2 tape, peak level
dbx "IN"	92dB	CrO_2 tape, peak level

2. A great improvement in the dynamic range makes it possible to extend the range to 110dB (at 1kHz, CrO_2 tape).
3. The direct logarthmic method of compression and expansion protects against problems caused by level mismatching.
4. Even if phase distortion occurs in the signal transmission system, precise operation is maintained by means of the RMS level detector.
5. A low distortion rate is maintained throughout the frequency range.
   - Improvement of high frequency response. The dbx system solves the problem of deteriorated high frequency at higher input levels which is an inherent fault of cassette tape equipment. The response at approx. 8,000Hz at 10dB input is improved as much as 14dB. As a result, flatter response is obtained at both low and high input levels.

Overall frequency response (RS-M240X)

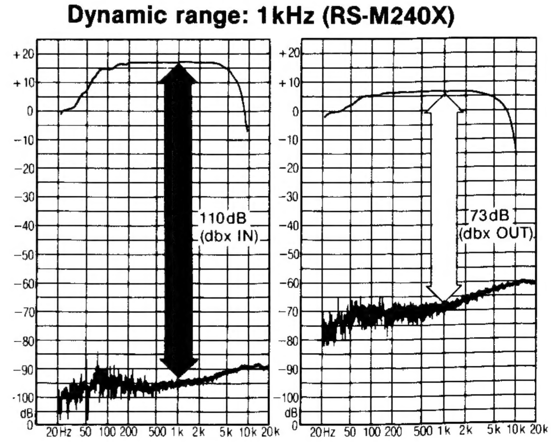


• Remarkable dynamic range of 110dB

About dynamic range:

The dynamic range refers to the output range of an audio transmission system, extending from the lowest recognizable level to the highest possible level produced. Dynamic range is one of the values used to express the degree of fidelity of an audio transmission system.

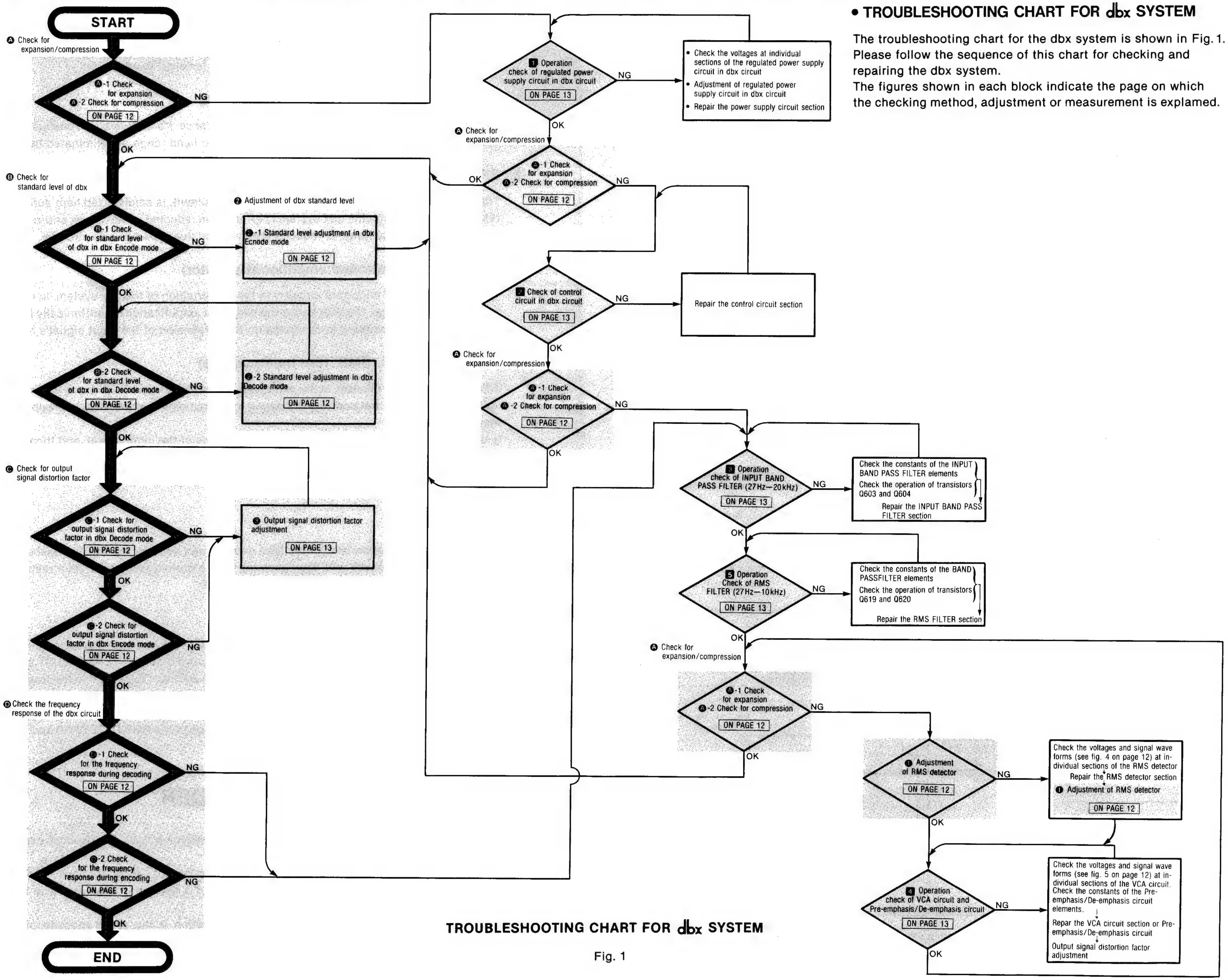
Dynamic range: 1kHz (RS-M240X)



MEASUREMENT AND ADJUSTMENT METHODS (FOR dbx SYSTEM)

• TROUBLESHOOTING CHART FOR dbx SYSTEM

The troubleshooting chart for the dbx system is shown in Fig. 1. Please follow the sequence of this chart for checking and repairing the dbx system.
The figures shown in each block indicate the page on which the checking method, adjustment or measurement is explamed.

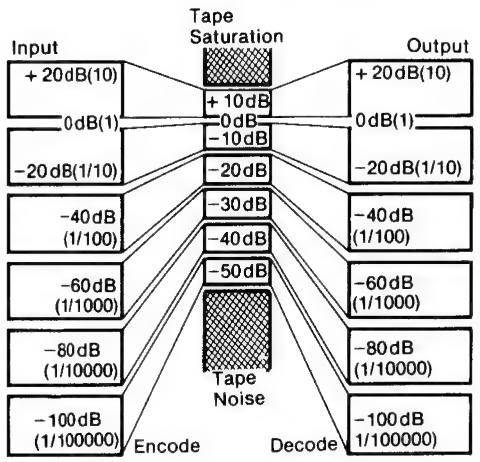


TROUBLESHOOTING CHART FOR dbx SYSTEM

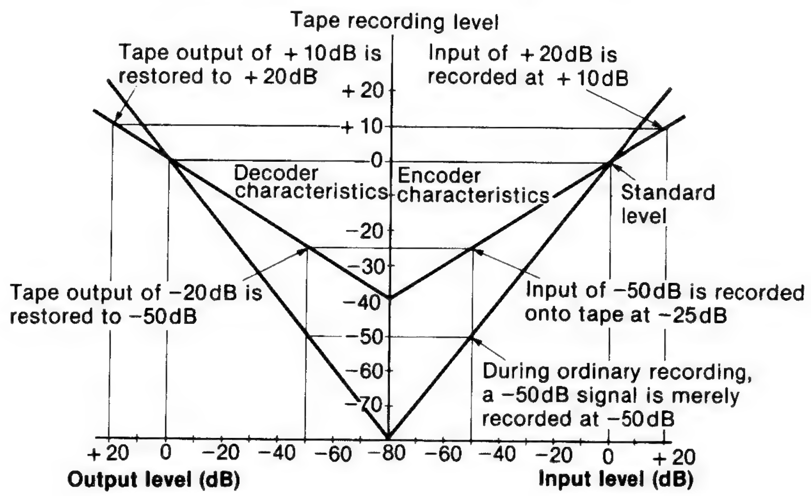
Fig. 1

- **Compressing the dynamic range to 1/2 before recording, and then expanding it (by 2x) before playback produces the remarkable dynamic range of the dbx system.**
  - The dynamic range of cassette tape with a saturation level of +10dB and a noise level of −45dB (such as Technics CrO_2 position tape) is 55dB. Any sounds with a level greater than +10dB will result in considerable distortion, and any sounds less than −45dB will be inaudible due to the effect of noise, making high-fidelity reproduction impossible.
    The dbx system, however, linearly compresses the input level by a ratio of 1/2 in decibels prior to recording it onto the tape. A +20dB sound is thus compressed to +10dB, a −20dB sound is compressed to −10dB, and a −90dB sound is compressed to −45dB.
    As a result, a signal with a dynamic range extending from −90dB to +20dB (a 110dB dynamic range) can be contained within a range which extends from −45dB to +10dB (a 55dB dynamic range). Recording onto a cassette tape with a 55dB dynamic range is then possible.
    Prior to playback, the exact opposite process occurs and the sound levels are expanded. The +10dB sound is restored to its original level of +20dB, the −10dB sound is restored to −20dB, and the −45dB sound is restored to −90dB.
    Therefore, the basic principle of the dbx system, as described above, is to compress the 110dB dynamic range by 1/2 to 55dB prior to recording, and then the expand it (by 2x) prior to playback.

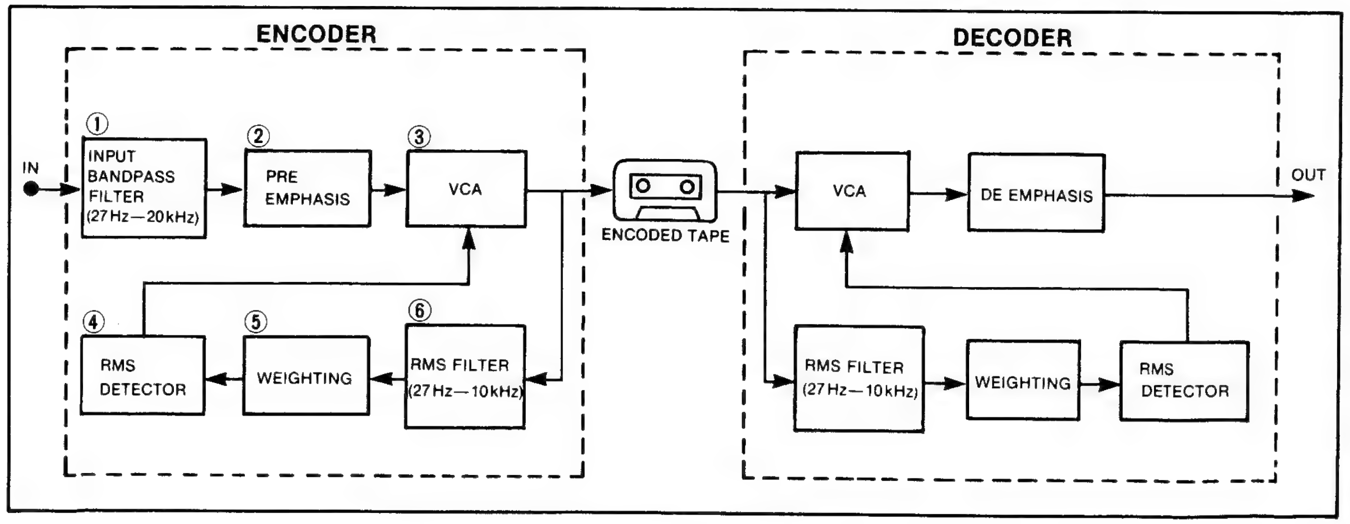
dbx system function diagram



Level compression/expansion diagram



THE BLOCK DIAGRAM OF dbx SYSTEM



(Block configuration change for dbx circuit Encode/Decode is electrically performed by switching transistors between blocks.)

ENCODER

- The portion of the dbx system with compresses the volume level of the input signal by 1/2 (measured in decibels), before seding it to the recording system, is called the encoder.

① INPUT BANDPASS FILTER (27Hz—20kHz)

To prevent pulse noise or other types of interference from causing erroneous operation of the dbx system, all signals outside the 27Hz—20kHz audio band range are eliminated here.

② PRE-EMPHASIS

The high frequency range, where hiss noise is prominent, is emphasized here during recording. The end result is that, although the dbx system is effective in reducing noise across entire frequency band, noise in the high frequency range is reduced still more by this pre-emphasis circuitry.

③ VCA (voltage-controlled amplifier/attenuator)

This is an extremely important circuitry in the construction of the dbx system. In response to the incoming DC control voltage, the VCA varies the degree of amplification logarithmically in the same manner as the direct current, resulting in compression and expansion of the input signal's dynamic range.

④ RMS DETECTOR (RMS: root mean square)

This is an important element in the composition of the dbx system, because its circuitry generates a DC voltage (the voltage that controls the degree of amplification in the VCA) in proportion to the size of the input signal.
It does this by detecting the root mean square value of the input signal, and then converting it to a DC voltage in proportion to the logarithm of the detected level.
Erroneous operation due to phase shift is prevented by monitoring of the voltage level derived from the root mean square value.

⑤ WEIGHTING

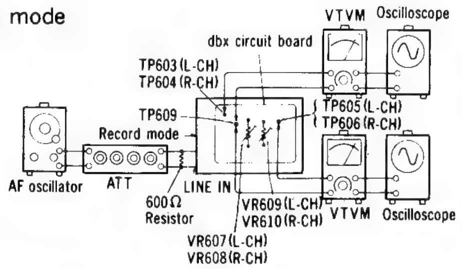
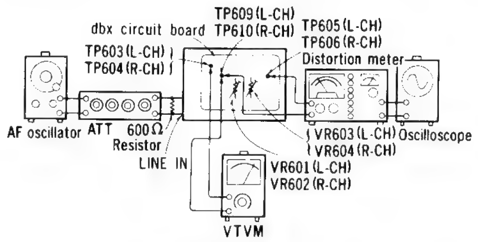
To prevent the saturation level of the tape deck in high frequencies, this increases the RMS DETECTOR high frequency sensitivity and decreases the VCA high frequency gain. As a result, the linearity of the tape deck is enhanced in the high frequency range.

⑥ RMS FILTER (27Hz to 10kHz)

This filter cuts any signal other than 27Hz to 10Hz that mixes in input signals to prevent the RMS DETECTOR from malfunctioning. Those to be cut include an FM tuner STEREO PILOT signal, tape deck bias leakage and record player motor rotational noise. In addition, the signal in the frequency range (27Hz to 10kHz) passing through the BAND PASS FILTER is comparatively small in level variations when handled by the tape deck.
This ensures correct complementarity in the operation of the RMS DETECTOR and VCA during Encoding and Decoding.

DECODER

As shown in the diagram on the previous page, for playback output, the decoder expands the constantly changing level to double the decibel range.
For example, 2 −30dB signal is expanded to −60dB, and a level of −45dB becomes −90dB. On the other hand, a playback output +10dB is expanded to +20dB, and a saturation level signal is also correspondingly increased.
In terms of the system's operation, the decoder's function is the exact opposite of the function of the previously mentioned encoder.

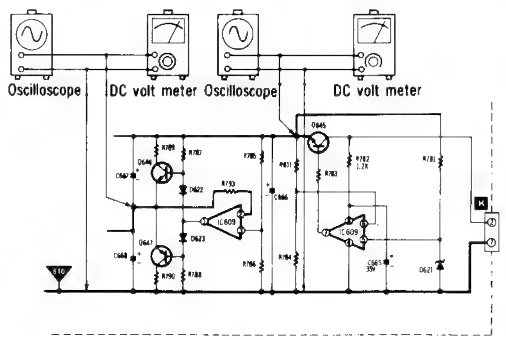
ITEM	ADJUSTMENT
Condition: • Record/stop mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**❷-1 Standard level adjustment in dbx Encode mode** 1. Make the connection as shown in fig. 12 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set unit to record mode, adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 3. Adjust VR607 (L-CH) and VR608 (R-CH) so that the output signal level at TP605 (L-CH) and TP606 (R-CH) becomes 300mV±0.5dB.  Fig. 12 **❷-2 Standard level adjustment in dbx Decode mode** 1. Make the connection as shown in fig. 12 and apply 1kHz −27dB signal from LINE IN, and perform the following adjustments. 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. Adjust VR609 (L-CH) and VR610 (R-CH) so that the output signal level at TP605 (L-CH) and TP606 (R-CH) becomes 300mV±0.5dB.
❸ Adjustment of output signal distortion factor Condition: • Stop mode • Input level controls ··· MAX • Noise reduction selector ··· disc Equipment: • VTVM • AF oscilloscope • ATT • Oscilloscope • Resistor (600Ω) • Distortion meter	1. Make the connection as shown in fig. 13 and apply 1kHz −27dB signal from LINE IN, and perform the following adjustments. 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV−3dB. 3. Adjust VR601 (L-CH) and VR602 (R-CH) so that output signal distortion at TP605 (L-CH) and TP606 (R-CH) is minimized.  Fig. 13 4. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV+2dB. 5. Adjust VR603 (L-CH) and VR604 (R-CH) so that output signal distortion at TP605 (L-CH) and TP606 (R-CH) is minimized. 6. Repeat adjustments 2 through 5 until the distortion factor is minimized.

NOTE:
After adjustments ❶, ❷ and ❸, re-check according to "dbx SYSTEM CHECKING METHOD".
If the specifications are not satisfied, perform the adjustments again.

• CHECKING PROCEDURE FOR PROBLEMS

NOTES: Find defective parts according to the circuit operation checking method given below, and use the results for your reference during repair. Remember to adjust after repair.
Keep good condition, set switches and controls in the following positions, unless otherwise specified.

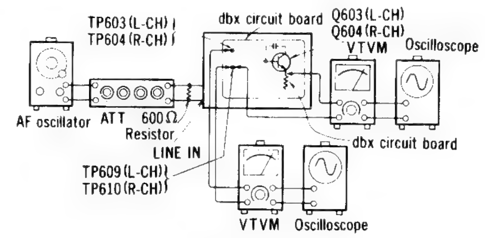
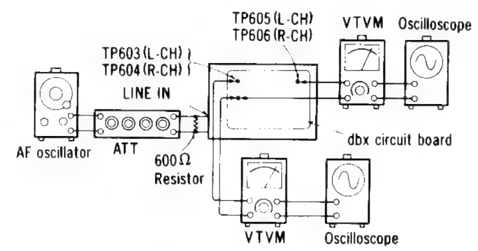
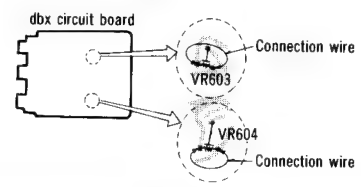
• Input selector: Line in • Input level controls: Maximum

ITEM	CHECKING METHOD
1 Operation check of regulated power supply circuit in dbx circuit Equipment: • DC volt meter • Oscilloscope	**1-1 Check of 19V voltage** Make the connection as shown in fig. 14 and make sure that the emitter voltage of Q645 (TP611) is around 19V. **1-2 Check of 9.5V voltage** Make the connection as shown in fig. 14 and make sure that the emitter voltage of Q647 is around 9.5V.  Fig. 14

ITEM	CHECKING METHOD
2 Check of control circuit in dbx circuit Equipment: • DC volt meter	E.C.B (G.S.D) voltage check of each switching transistor for Encode/Decode The terminal voltage of each switching transistor in Encode/Decode mode are shown in the table below.

Transistor Ref. No.	Encode			Decode		
	E (G)	C (S)	B (D)	E (G)	C (S)	B (D)
Q601, 602	0V	9.4V	9.4V	0V	9.4V	9.4V
Q605	10.3V	9.5V	0V	10.3V	10.2V	10.8V
Q606	10.4V	9.5V	0V	10.4V	10.4V	11.0V
Q607	10.3V	10.3V	10.8V	0V	10.3V	0V
Q608	10.4V	10.4V	11.0V	0V	10.4V	0V
Q615	0V	9.5V	0V	9.5V	9.5V	10.0V
Q628	0V	9.4V	9.3V	0V	9.4V	9.3V
Q629, 630	0V	9.5V	9.5V	0V	9.5V	9.5V
Q631, 632	0V	9.4V	9.4V	0V	9.4V	9.4V
Q633	0V	9.1V	9.0V	0V	9.1V	9.0V
Q634	0V	9.1V	9.1V	0V	9.1V	9.1V
Q635, 636	0V	9.1V	9.1V	0V	9.1V	9.1V
Q637	0V	0.3V	0V	0V	0.6V	0V
Q638	0V	22.0V	0V	0V	22.0V	0V
Q640	0V	0V	0.7V	0V	17.4V	0V

NOTE:
If no abnormality is found in steps 1 and 2, check the operation for each part as follows:

ITEM	CHECKING METHOD
3 Operation check of INPUT BAND PASS FILTER circuit (27Hz−20kHz) Condition: • Record mode • Input level controls ··· MAX • Noise reduction selector ··· dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	1. Make the connections as shown in fig. 15, and apply 100Hz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode. 3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 4. Make sure that the emitter signal level of Q603 (L-CH) and Q604 (R-CH) is 300mV.  Fig. 15 5. Set the input signal frequency to 5kHz and make sure that the emitter signal of Q603 (L-CH) and Q604 (R-CH) remains at the same level (300mV).
4 Operation check of VCA circuit and Pre-emphasis/De-emphasis circuit Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**4-1 Operation check of VCA circuit and Pre-emphasis circuit** 1. Make the connections as shown in fig. 16, and apply 100Hz −27dB signal from LINE IN. 2. Short-circuit both terminals of VR603 (L-CH) and VR604 (R-CH) as shown in fig. 17 to make the VCA control voltage 1/2Vcc (9.5V), so that the gain of VCA does not change. 3. Set the unit to record mode, and set the noise reduction selector to dbx tape position. 4. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 5. Make sure that the output signals at TP605 (L-CH) and TP606 (R-CH) are sinusoidal. (The operation of VCA can then be checked.)  Fig. 16  Fig. 17

ITEM
5 Operation ch RMS FILTER (27Hz−10k Condition: • Stop mode • Input level contr • Noise reduction Equipment: • VTVM • A • ATT • C • Resistor (600Ω

ITEM	CHECKING METHOD
2 Check of control circuit in dbx circuit Equipment: • DC volt meter	**E.C.B (G.S.D) voltage check of each switching transistor for Encode/Decode** The terminal voltage of each switching transistor in Encode/Decode mode are shown in the table below.

Transistor Ref. No.	Encode			Decode		
	E (G)	C (S)	B (D)	E (G)	C (S)	B (D)
Q601, 602	0V	9.4V	9.4V	0V	9.4V	9.4V
Q605	10.3V	9.5V	0V	10.3V	10.2V	10.8V
Q606	10.4V	9.5V	0V	10.4V	10.4V	11.0V
Q607	10.3V	10.3V	10.8V	0V	10.3V	0V
Q608	10.4V	10.4V	11.0V	0V	10.4V	0V
Q615	0V	9.5V	0V	9.5V	9.5V	10.0V
Q628	0V	9.4V	9.3V	0V	9.4V	9.3V
Q629, 630	0V	9.5V	9.5V	0V	9.5V	9.5V
Q631, 632	0V	9.4V	9.4V	0V	9.4V	9.4V
Q633	0V	9.1V	9.0V	0V	9.1V	9.0V
Q634	0V	9.1V	9.1V	0V	9.1V	9.1V
Q635, 636	0V	9.1V	9.1V	0V	9.1V	9.1V
Q637	0V	0.3V	0V	0V	0.6V	0V
Q638	0V	22.0V	0V	0V	22.0V	0V
Q640	0V	0V	0.7V	0V	17.4V	0V

NOTE:
If no abnormality is found in steps **1** and **2**, check the operation for each part as follows:

3 Operation check of INPUT BAND PASS FILTER circuit (27Hz—20kHz)

Condition:
- Record mode
- Input level controls ··· MAX
- Noise reduction selector ··· dbx tape

Equipment:
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)

1. Make the connections as shown in fig. 15, and apply 100Hz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position.
2. Set the unit to record mode.
3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV.
4. Make sure that the emitter signal level of Q603 (L-CH) and Q604 (R-CH) is 300mV.
5. Set the input signal frequency to 5kHz and make sure that the emitter signal of Q603 (L-CH) and Q604 (R-CH) remains at the same level (300mV).

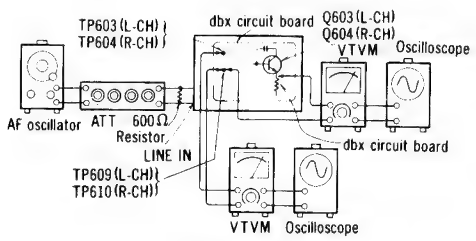


Fig. 15

4 Operation check of VCA circuit and Pre-emphasis/De-emphasis circuit

Condition:
- Stop/record mode
- Input level controls ··· MAX
- Noise reduction selector ··· disc/dbx tape

Equipment:
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)

4-1 Operation check of VCA circuit and Pre-emphasis circuit

1. Make the connections as shown in fig. 16, and apply 100Hz −27dB signal from LINE IN.
2. Short-circuit both terminals of VR603 (L-CH) and VR604 (R-CH) as shown in fig. 17 to make the VCA control voltage 1/2 Vcc (9.5V), so that the gain of VCA does not change.
3. Set the unit to record mode, and set the noise reduction selector to dbx tape position.
4. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV.
5. Make sure that the output signals at TP605 (L-CH) and TP606 (R-CH) are sinusoidal.
(The operation of VCA can then be checked.)

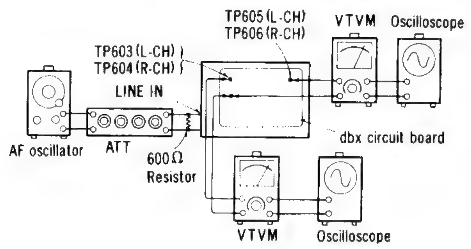


Fig. 16

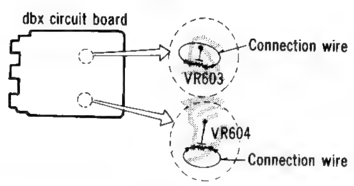


Fig. 17

6. Shift the frequency of input signal to 5kHz, and make sure that the output signal levels at TP605 (L-CH) and TP606 (R-CH) are increased by about 12dB.
(The operation of the Pre-emphasis circuit can then be checked.)

4-2 Operation check of VCA circuit and De-emphasis circuit

1. The procedure is the same as 1—2 for the above VCA circuit and Pre-emphasis circuit.
2. Set the noise reduction selector to disc position.
3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV.
4. Make sure that the output signals at TP605 (L-CH) and TP606 (R-CH) are sinusoidal.
(The operation of VCA can then be checked.)
5. Change the frequency of input signal to 5kHz and make sure that the output signal level at TP605 (L-CH) and TP606 (R-CH) is decreased by about 12dB.
(The operation of the De-emphasis circuit can then be checked.)

NOTE: After check, disconnect the short-circuited terminals of VR603 (L-CH) and VR604 (R-CH).

5 Operation check of RMS FILTER circuit (27Hz—10kHz)

Condition:
- Stop mode
- Input level controls ··· MAX
- Noise reduction selector ··· disc

Equipment:
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)

1. Make the connections as shown in fig. 18, and apply 100Hz −27dB signal from LINE IN.
2. Set the noise reduction selector to disc position.
3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV.
4. Make sure that the emitter signal level of Q619 (L-CH) and Q620 (R-CH) is around 300mV.
5. Change the frequency of input signal to 5kHz and make sure that the emitter signal of Q619 (L-CH) and Q620 (R-CH) remains at the same level (300mV).

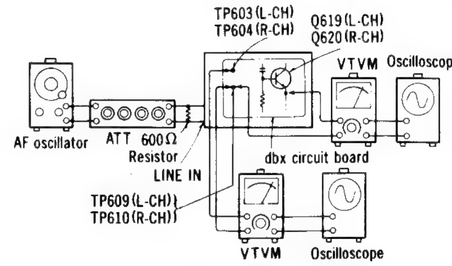


Fig. 18

• ADJUSTMENT PARTS LOCATION OF dbx SYSTEM

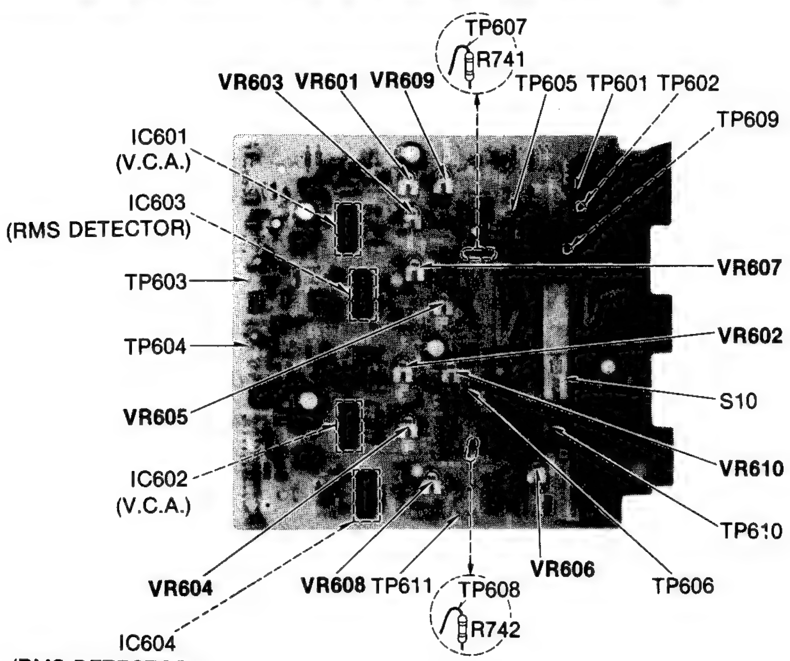


Fig. 2

• SIGNAL WAVE FORMS AT INDIVIDUAL SECTIONS OF THE RMS DETECTOR CIRCUIT & VCA CIRCUIT (FOR OPERATION CHECK OF dbx SYSTEM)

Figures 4 and 5 show the signal waveforms at pins of the major ICs when an input signal (1kHz, 300mV) shown in Fig. 3 is applied to the input terminals TP603 (L-CH) and TP604 (R-CH) of the dbx system.

Input signal wave form at TP603 (L-CH), TP604 (R-CH)

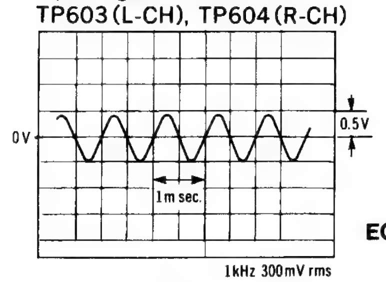


Fig. 3

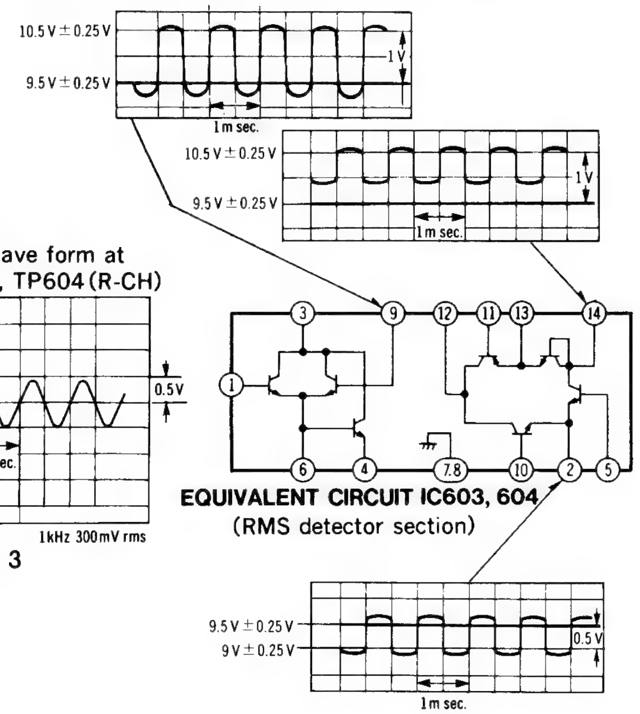


Fig. 4

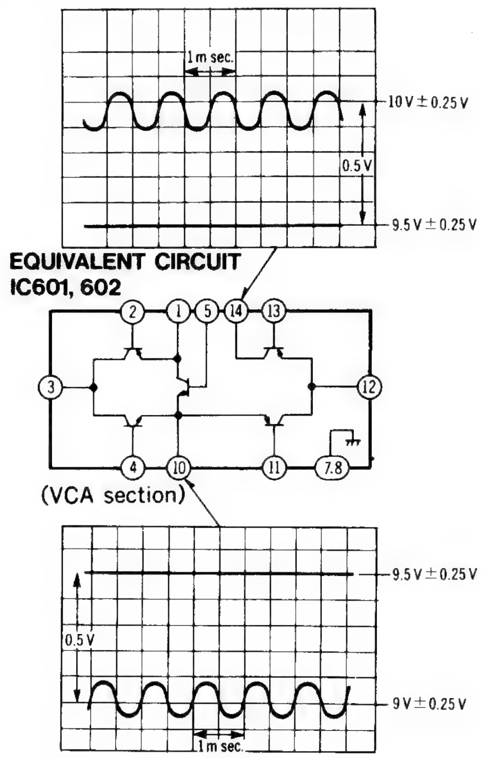


Fig. 5

Measurement Method and condition

1. Make the connections as shown in fig. 6, and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position.
2. Set the unit to record mode, adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV.

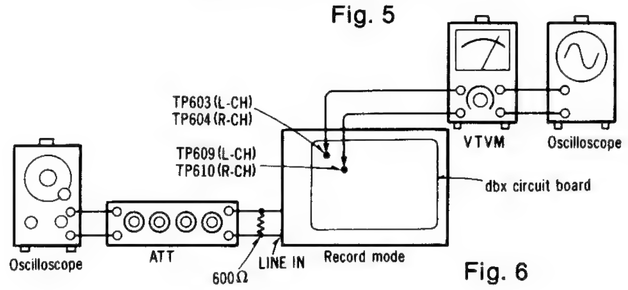
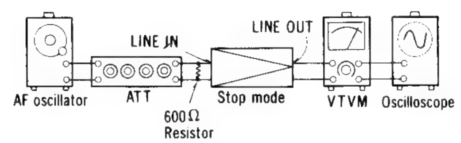
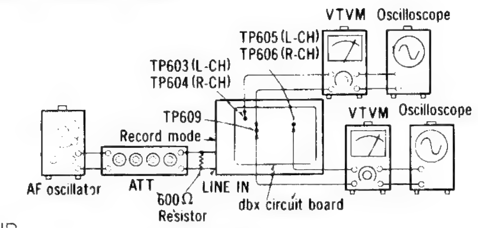
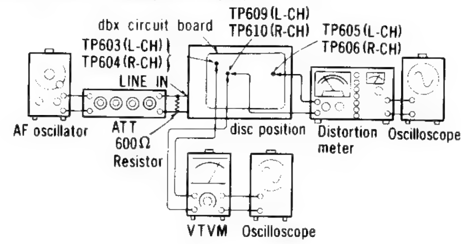


Fig. 6

• dbx SYSTEM CHECKING METHOD

NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Input selector: Line in
- Input level controls: Maximum

ITEM	CHECKING METHOD
A Check for expansion/compression Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**A-1 Check for expansion** 1. Make the connections as shown in fig. 7 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to disc position. 2. Adjust ATT, increase input signal level by 10dB, and make sure that the reading for VTVM increases by 20dB±1dB. 3. Adjust ATT, decrease the input signal level, and make sure that the reading for VTVM decreases by 20dB±1dB.  Fig. 7 **A-2 Check for compression** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode. 3. Adjust ATT, increase input signal level by 10dB, and make sure that the reading for VTVM at TP605 (L-CH) and TP606 (R-CH) increases by 5±1dB. 4. Adjust ATT, decrease the input signal level, and make sure that the reading for VTVM at TP605 (L-CH) and TP606 (R-CH) decreases by 5±1dB.
B Check for standard level of dbx Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**B-1 Check for standard level of dbx in dbx Encode mode** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode, adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 3. Make sure that the signal level at TP605 (L-CH) and TP606 (R-CH) is 300mV±0.5dB.  Fig. 8 **B-2 Check for standard level of dbx in dbx Decode mode** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. Make sure that the signal level at TP605 (L-CH) and TP606 (R-CH) is 300mV±0.5dB.
C Check for output signal distortion factor (Check for distortion factor of VCA) Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω) • Distortion meter	**C-1 Check for output signal distortion factor in dbx Decode mode** 1. Make the connections as shown in fig. 9 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. Measure the distortion factor of output signal at TP605 (L-CH) and TP606 (R-CH), and make sure that the distortion factor is less than 0.2%.  Fig. 9 4. Next, adjust ATT to raise the output signal level by 10dB and measure the distortion of output factor at TP605 (L-CH) and TP606 (R-CH). Make sure that the distortion is less than 0.8%. 5. Adjust ATT to set the output signal at a level 10dB lower than the dbx reference level (300mV), and measure the output signal distortion at TP605 (L-CH) and TP606 (R-CH) to check that it is less than 0.3%. **C-2 Check for output signal distortion factor in dbx Encode mode** 1. The connection is the same as above, as is the input signal. 2. Set the noise reduction selector to dbx tape position, and the unit to record mode. 3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 4. Measure the distortion factor of output signal at TP605 (L-CH) and TP606 (R-CH), and make sure that the distortion factor is less than 0.25%.

D Check respon circuit
Condition:
• Stop/rec
• Input lev
• Noise re
Equipment
• VTVM
• ATT
• Resistor

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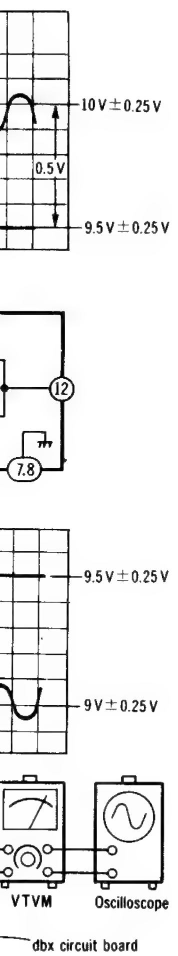
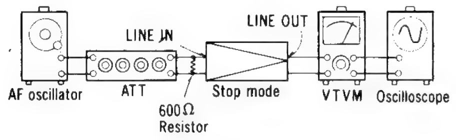
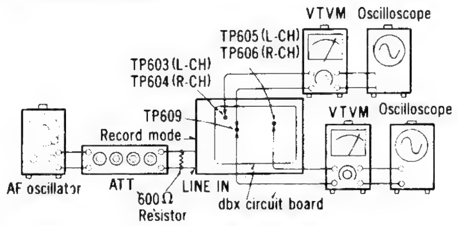
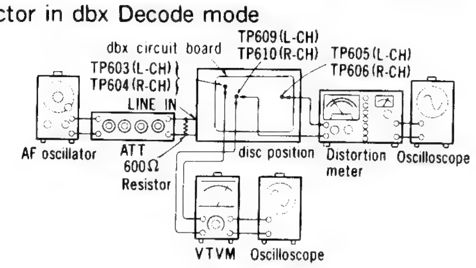


Fig. 6

• dbx SYSTEM CHECKING METHOD

NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

• Input selector: Line in • Input level controls: Maximum

ITEM	CHECKING METHOD
A Check for expansion/ compression Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**A-1 Check for expansion** 1. Make the connections as shown in fig. 7 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to disc position. 2. Adjust ATT, increase input signal level by 10dB, and make sure that the reading for VTVM increases by 20dB±1dB. 3. Adjust ATT, decrease the input signal level, and make sure that the reading for VTVM decreases by 20dB±1dB.  Fig. 7 **A-2 Check for compression** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode. 3. Adjust ATT, increase input signal level by 10dB, and make sure that the reading for VTVM at TP605 (L-CH) and TP606 (R-CH) increases by 5±1dB. 4. Adjust ATT, decrease the input signal level, and make sure that the reading for VTVM at TP605 (L-CH) and TP606 (R-CH) decreases by 5±1dB.
B Check for standard level of dbx Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**B-1 Check for standard level of dbx in dbx Encode mode** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode, adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 3. Make sure that the signal level at TP605 (L-CH) and TP606 (R-CH) is 300mV±0.5dB.  Fig. 8 **B-2 Check for standard level of dbx in dbx Decode mode** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. Make sure that the signal level at TP605 (L-CH) and TP606 (R-CH) is 300mV±0.5dB.
C Check for output signal distortion factor (Check for distortion factor of VCA) Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω) • Distortion meter	**C-1 Check for output signal distortion factor in dbx Decode mode** 1. Make the connections as shown in fig. 9 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. Measure the distortion factor of output signal at TP605 (L-CH) and TP606 (R-CH), and make sure that the distortion factor is less than 0.2%. 4. Next, adjust ATT to raise the output signal level by 10dB and measure the distortion of output factor at TP605 (L-CH) and TP606 (R-CH). Make sure that the distortion is less than 0.8%. 5. Adjust ATT to set the output signal at a level 10dB lower than the dbx reference level (300mV), and measure the output signal distortion at TP605 (L-CH) and TP606 (R-CH) to check that it is less than 0.3%.  Fig. 9 **C-2 Check for output signal distortion factor in dbx Encode mode** 1. The connection is the same as above, as is the input signal. 2. Set the noise reduction selector to dbx tape position, and the unit to record mode. 3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 4. Measure the distortion factor of output signal at TP605 (L-CH) and TP606 (R-CH), and make sure that the distortion factor is less than 0.25%.

ITEM	CHECKING METHOD
	5. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV+15dB. 6. Make sure that the distortion factor of output signal is less than 0.8%. (Bias oscillation→STOP)
D Check the frequency response of the dbx circuit Condition: • Stop/record mode • Input level controls ··· MAX • Noise reduction selector ··· disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	**D-1 Check the frequency response during decoding** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 3. With the signal level at TP605 (L-CH) and TP606 (R-CH) as 0dB, change the signal frequency to 100Hz, 20Hz and 7kHz respectively. Read signal levels at TP605 (L-CH) and TP606 (R-CH) and check that they are within the specifications-1. **D-2 Check the frequency response during encoding** 1. Make the connections as shown in fig. 8 and apply 1kHz −27dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to dbx tape position, and the unit to record mode. 3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) is 300mV. 4. With the signal level at TP605 (L-CH) and TP606 (R-CH) as 0dB, change the signal frequency to 100Hz and 7kHz respectively. Read signal levels at TP605 (L-CH) and TP606 (R-CH) and check that they are within the specifications-2.

Specifications-1

Frequency	Signal levels at TP605 and TP606
1kHz	0dB (300mV)
100Hz	−0.5dB±1dB
20Hz	−28dB±5dB
7kHz	+7dB±1dB

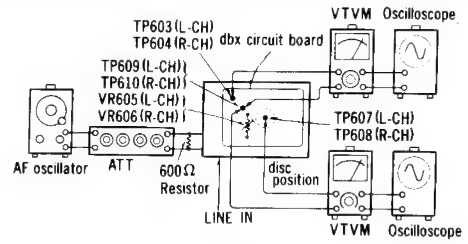
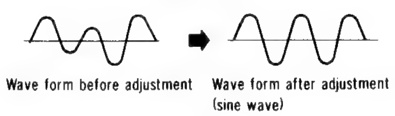
Specifications-2

Frequency	Signal levels at TP605 and TP606
1kHz	0dB (300mV)
100Hz	+0.5dB±1dB
7kHz	−3.5dB±1dB

NOTES:
• If the results of the above checks A, B, C and D do not satisfy the specifications, perform the following adjustments. If the specifications are not satisfied even after the adjustments, follow the checking procedure for problems.
• If the output signal is not produced or is extremely distorted, follow the checking procedure for problems.

• ADJUSTMENT OF dbx SYSTEM

NOTES: When adjusting the circuit of the dbx system, be sure to perform the adjustments in the following order:
1) Adjustment of RMS detector, 2) Adjustment of dbx standard level
3) Adjustment of output signal distortion factor.
Keep good condition, set switches and controls in the following positions, unless otherwise specified.
• Input selector: Line in • Input level controls: Maximum

ITEM	ADJUSTMENT
1 Adjustment of RMS detector Condition: • Stop mode • Input level controls ··· MAX • Noise reduction selector ··· disc Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	1. Make the connections as shown in fig. 10, and set the noise reduction selector to disc position. 2. Apply 50Hz −27dB signal from LINE IN. 3. Adjust ATT so that the signal level at TP603 (L-CH) and TP604 (R-CH) becomes 300mV. 4. Make sure that the output signal at TP607 (L-CH) and TP608 (R-CH) (Shown in fig. 2) is at 100Hz sine wave. If the output signal is not sinusoidal as shown in fig. 11, adjust VR605 (L-CH) and VR606 (R-CH) to make it sinusoidal.  Fig. 10  Fig. 11 NOTE: The voltage of the output signal after adjustment is about 0.8 to 1.1mVrms.
2 Adjustment of dbx standard level	NOTE: Be sure to perform the standard level adjustment in dbx Encode, followed by the standard level adjustment in dbx Decode.

 RS-M240X

HOW TO REPAIR PRINTED RESISTORS

- The printed resistor is located on the printed circuit board as illustrated in Fig. 1.
  (The through-holes are the points that connect the silver pattern and the pattern on the rear of the printed circuit board.)
- Repair the printed resistor, when disconnected, in the following procedure:
  1. Using a pointed screwdriver or knife, completely scrape the printed resistor as illustrated in Fig. 2, and remove its shavings.

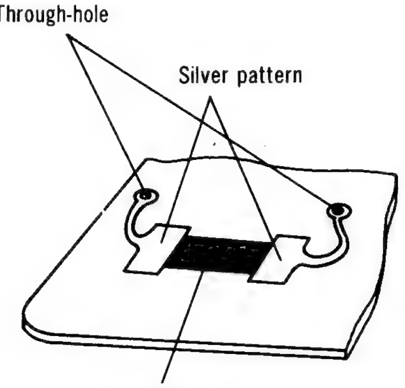


Fig. 1

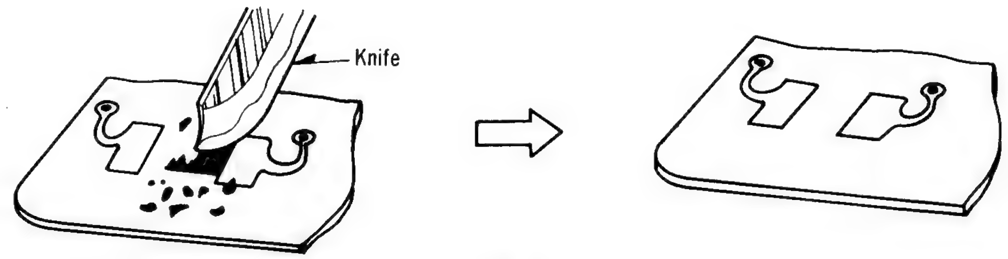


Fig. 2

2. Turning the printed circuit board over as shown in Fig. 3, scrape the copper pattern surface near the through-holes until the copper foil surface can be exposed.
3. Solder the carbon resistor, whose resistance value is identical to the removed printed resistor, to the exposed copper foil surface.
   (Refer to the schematic diagram of the Service Manual for the resistance values of printed resistors.)

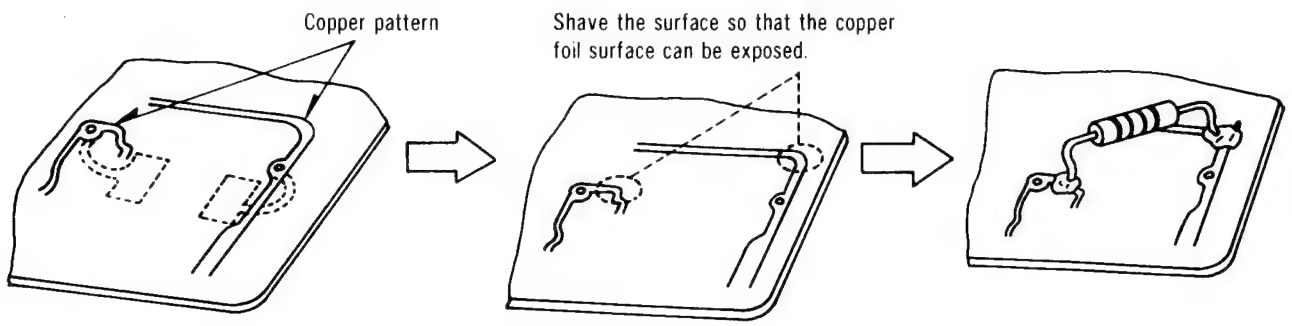
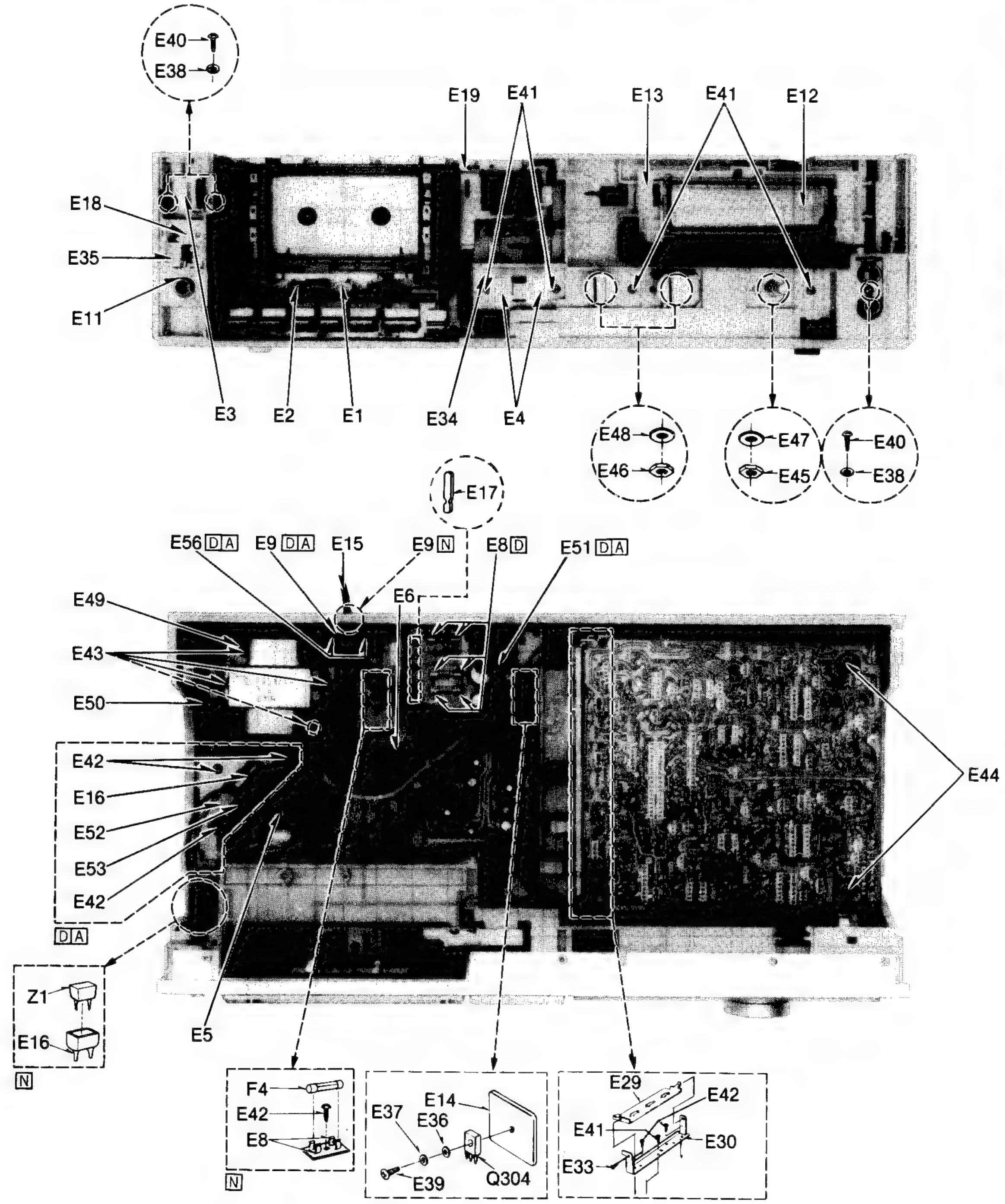
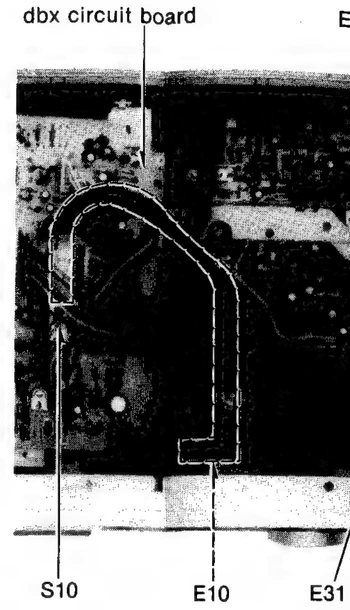
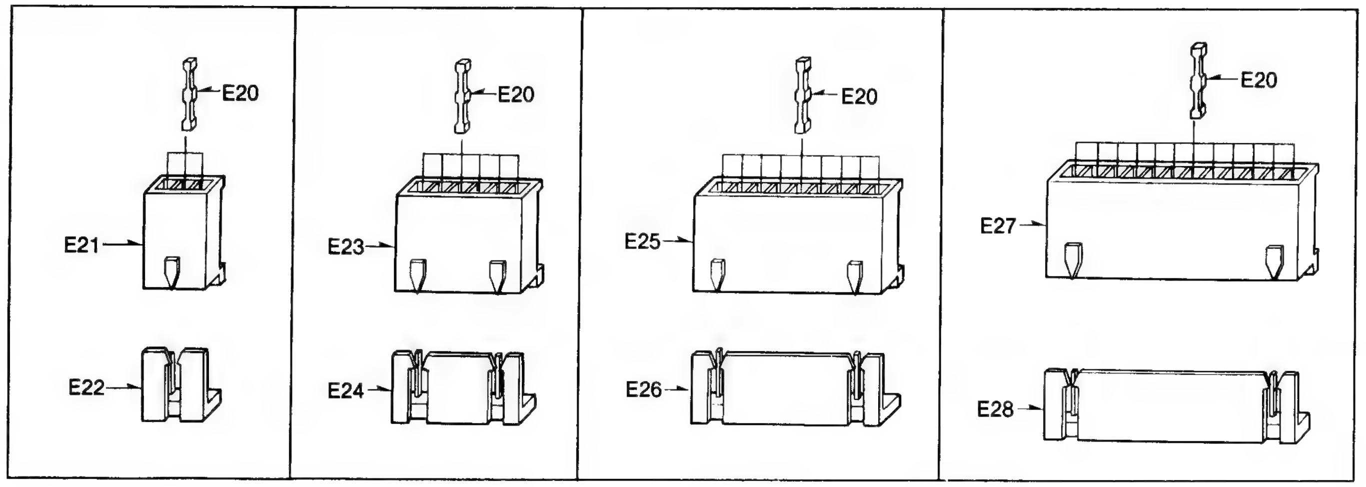


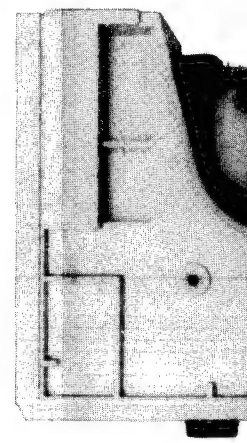
Fig. 3

ELECTRICAL PARTS LOCATION

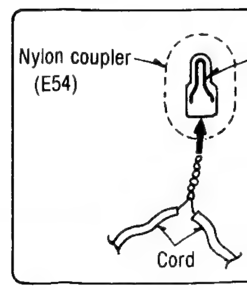








Note: Cord connection
coupler (E54) req
tool.



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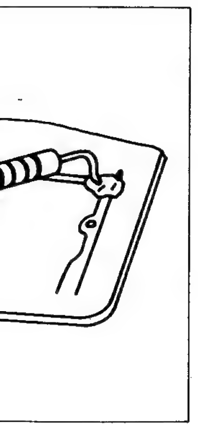
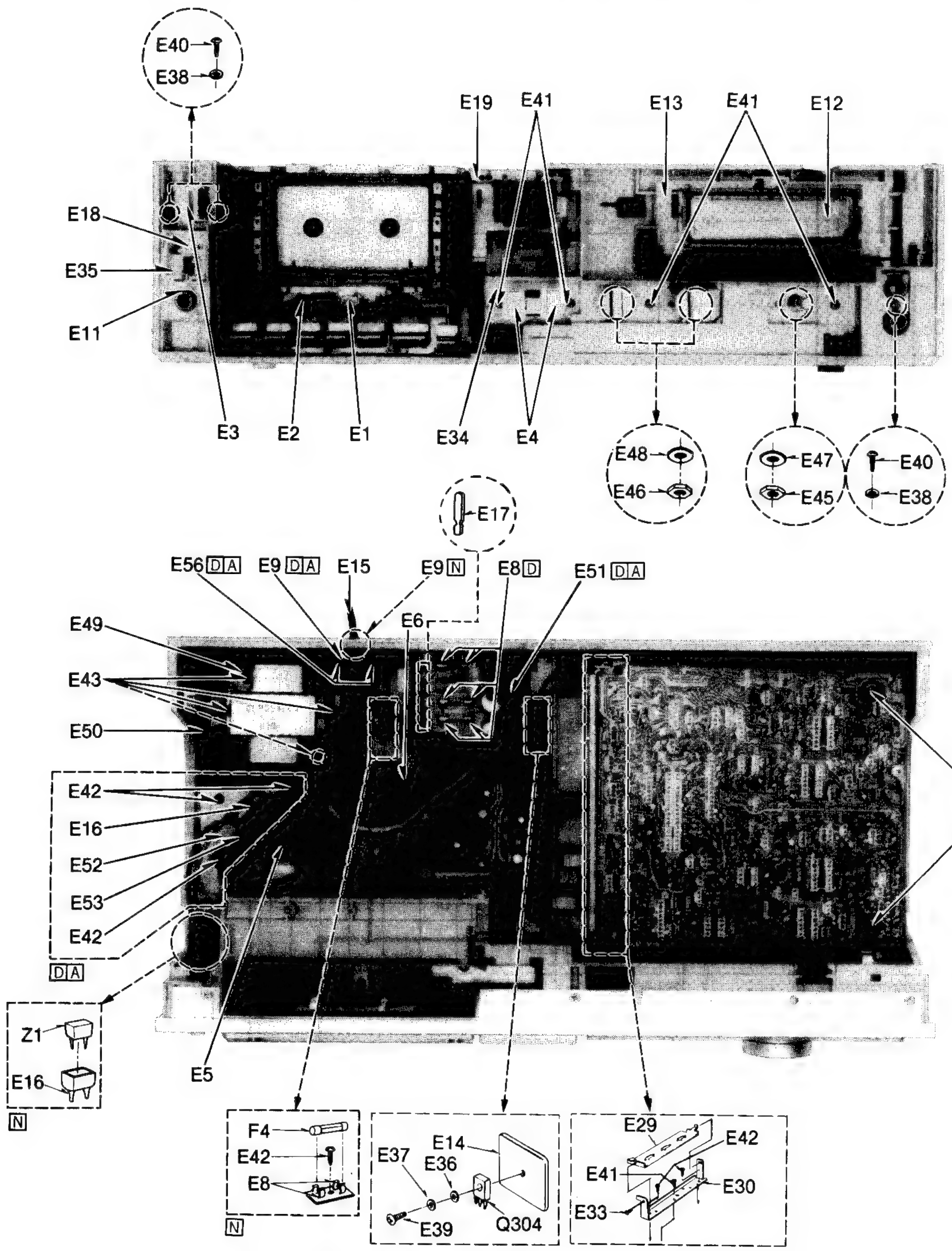
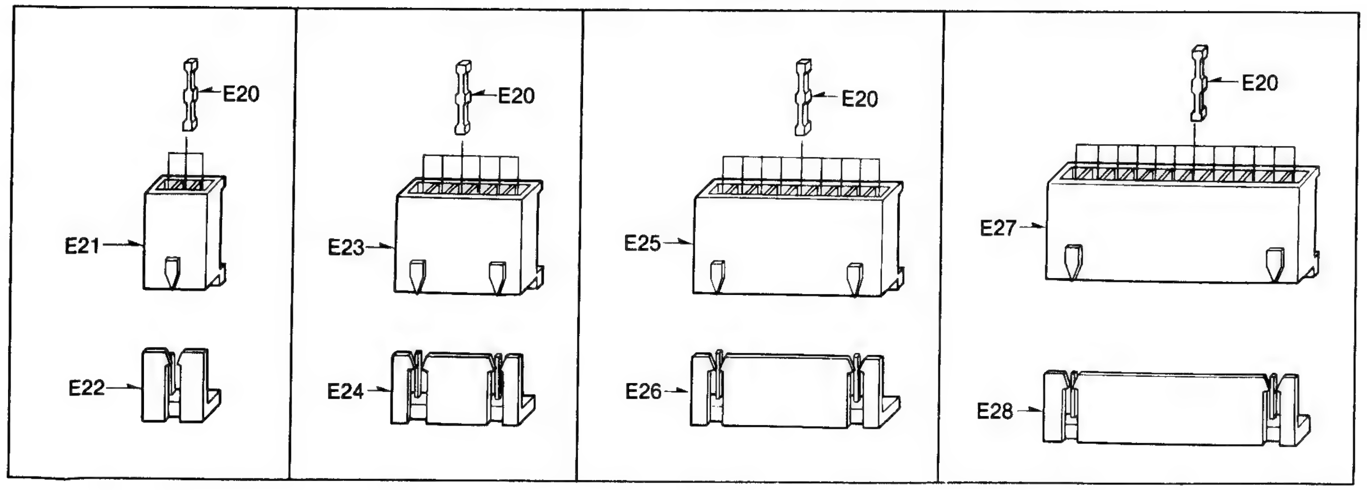
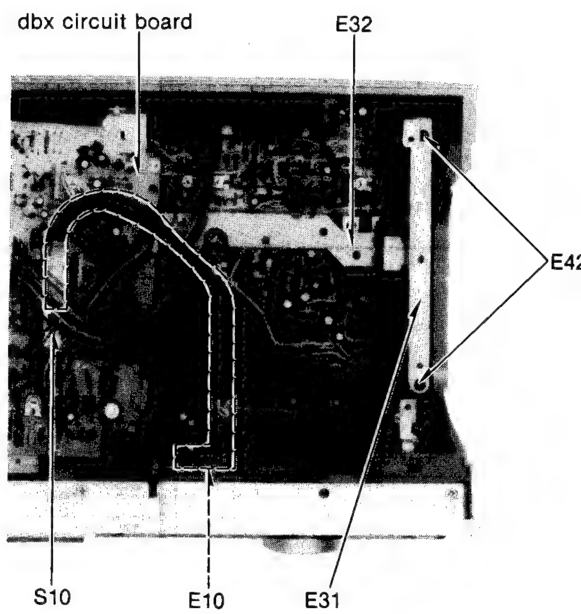
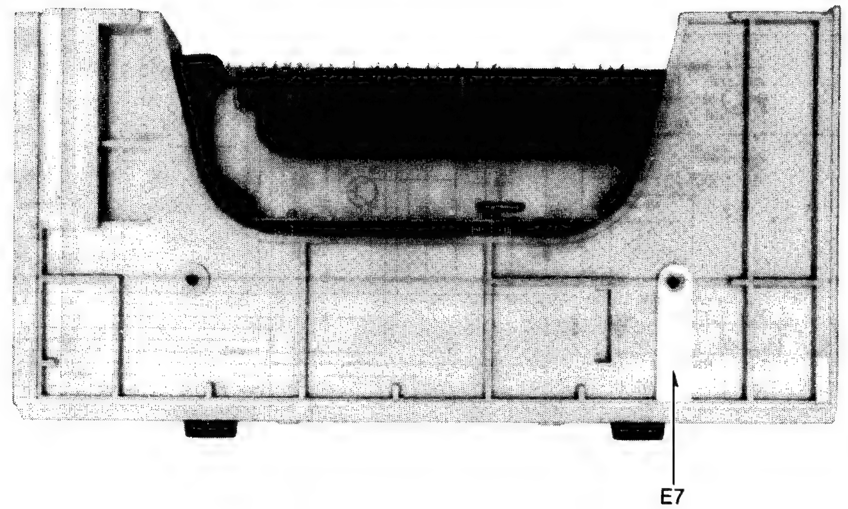


ELECTRICAL PARTS LOCATION

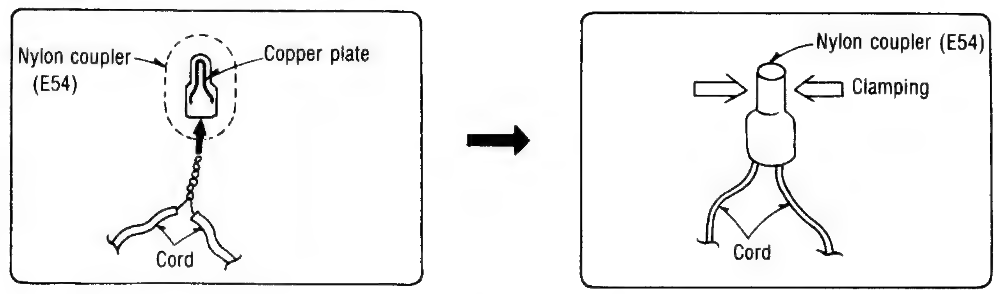








Note: Cord connection using this nylon coupler (E54) requires a special tool.

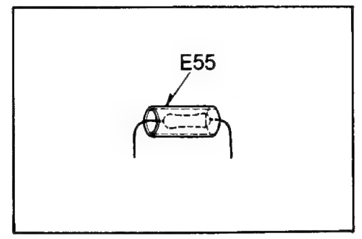


REPLACEMENT PARTS LIST

Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

NOTES:
- [D] ...For all European areas.
- [N] ...For Asia, Latin America, Middle East, and Africa areas.
- [A] ...For Australia.

Ref. No.	Part No.	Part Name & Description
	ELECTRICAL PARTS	
E1	QWY4123Z	Record/Playback Head
E2	QWY2138Z	Erase Head
E3	QG01872	Push Button (Power ON/OFF)
E4	QG01799S	Push Button (Input Selector and REC MUTE)
E5	QML3664	Recording Lever
E6	QBS1130	Recording Wire
E7	QJC0034	Earth Plate
E8 [D] ⚠	QTF1054	Fuse Holder
*For all European areas.		
[N] ⚠	QTF1049	〃
*For Asia, Latin America, Middle East and Africa areas.		
E9 [D][A]	QTD1164	Cord Clamper
*For all European areas and Australia.		
[N]	QTD1129	Cord Bushing
*For Asia, Latin America, Middle East and Africa areas.		
E10	ESA33227B	Rotary Selector (for Switching S10)
E11	QNQ1070	Nut 12ϕ
E12	QSLS006RF	FL Meter
E13	QKJ0406	Meter Holder
E14	QTH1156	Heat Sink
E15 [D] ⚠	SJA88	AC Power Cord
*For all European areas.		
[N] ⚠	RJA52ZB-K	〃
*For Asia, Latin America, Middle East and Africa areas.		
[A] ⚠	SJAG23	〃
*For Australia.		
E16 [D][A]	QTW1195	Spark Killer Cover
*For all European areas and Australia.		
[N]	QTW1118	〃
*For Asia, Latin America, Middle East and Africa areas.		
E17	QJT1067	Pin Terminal
E18	XAMQ46P400	Pilot Lamp
E19	QJT0015	Lug Terminal
E20	QJT1054	Contact
E21	QJS1921TN	3 Pin Socket
E22	QJP1921TN	3 Pin Post
E23	QJS1922TN	6 Pin Socket
E24	QJP1922TN	6 Pin Post
E25	QJS1923TN	9 Pin Socket
E26	QJP1923TN	9 Pin Post
E27	QJS1924TN	12 Pin Socket
E28	QJP1924TN	12 Pin Post
E29	QMA4065	Circuit Board Angle-A
E30	QMA4066	Circuit Board Angle-B
E31	QMA4067	Circuit Board Angle-C
E32	QMA4068	Center Angle
E33	QHQ1177S	Step Screw
E34	QMA3956	Volume Angle
E35	QKJ0440	Pilot Lamp Cover
E36	XWA26B	Washer 2.6ϕ
E37	XWG26	Washer 2.6ϕ
E38	XWA3B	Washer 3ϕ
E39	XSN26+8	Screw ⊕2.6×8
E40	XSN3+8S	Screw ⊕3×8
E41	XTN3+8B	Tapping Screw ⊕3×8
E42	XTN3+10B	Tapping Screw ⊕3×10
E43	XTB4+10BFN	Screw ⊕4×10
E44	XTWQC3+8LFR	Screw ⊕3×8
E45	QNQ1039	Nut 9ϕ
E46	QNQ1004	Nut 8ϕ
E47	QWQ1133	Washer 9ϕ
E48	QWQ2002	Washer 8ϕ
E49	QMA4278	Transformer Angle
E50	QTS1553	Shield Plate
E51 [D][A]	QTWM0026	Switch Cover (for S9)
*For all European areas and Australia.		
E52 [D][A]	QMA4258	Terminal Plate Angle
*For all European areas and Australia.		
E53 [D][A]	QJT4017	4 Pin Terminal Plate
*For all European areas and Australia.		
E54 [N] ⚠	QJT1029	Nylon Coupler
*For Asia, Latin America, Middle East and Africa areas.		
E55 [D]	QZE0003	Porcelain Tube (for R782, 789, 790 and D621)
*For all European areas.		
E56 [D][A]	XTN3+16B	Tapping Screw ⊕3×16
*For all European areas and Australia.		

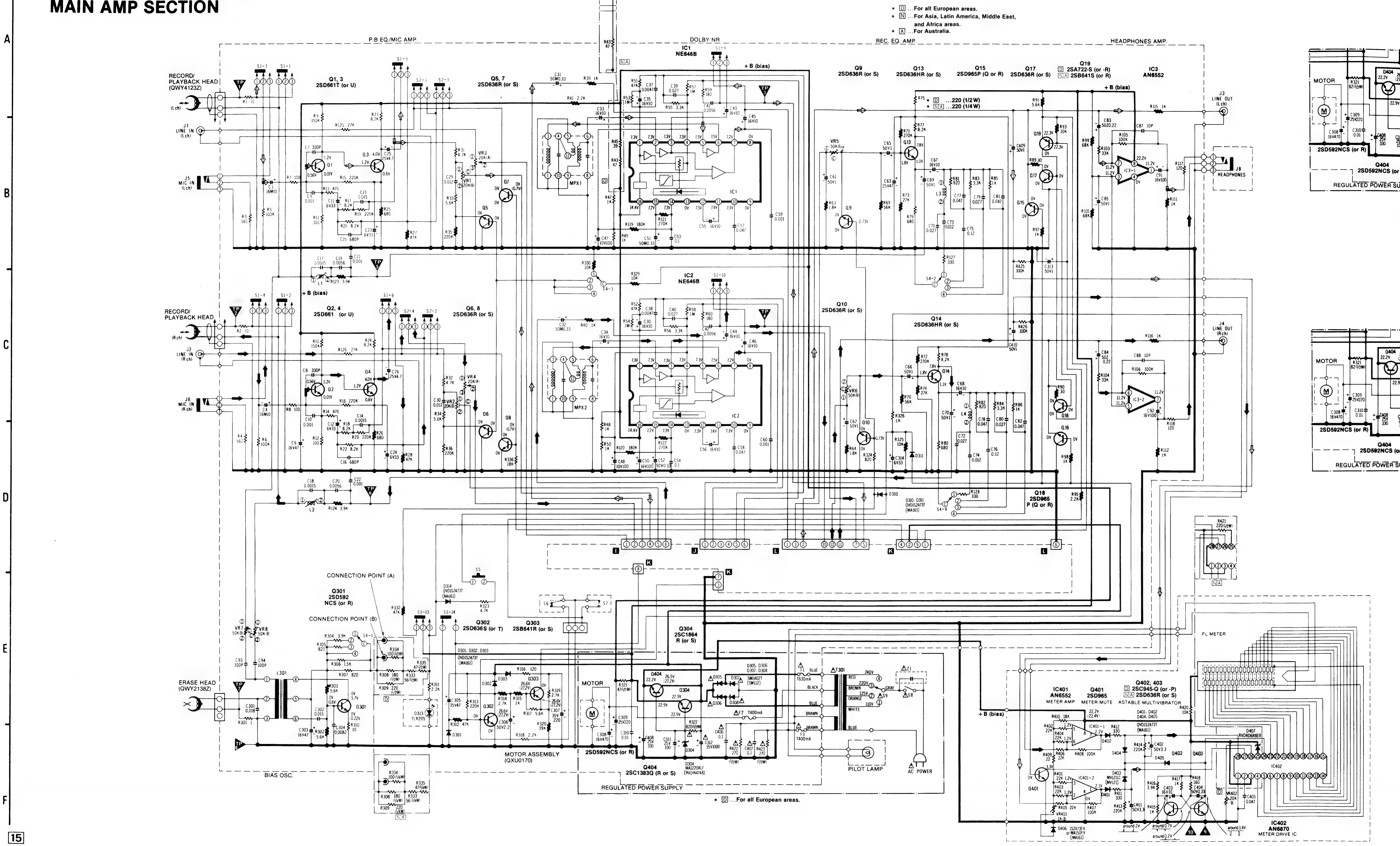


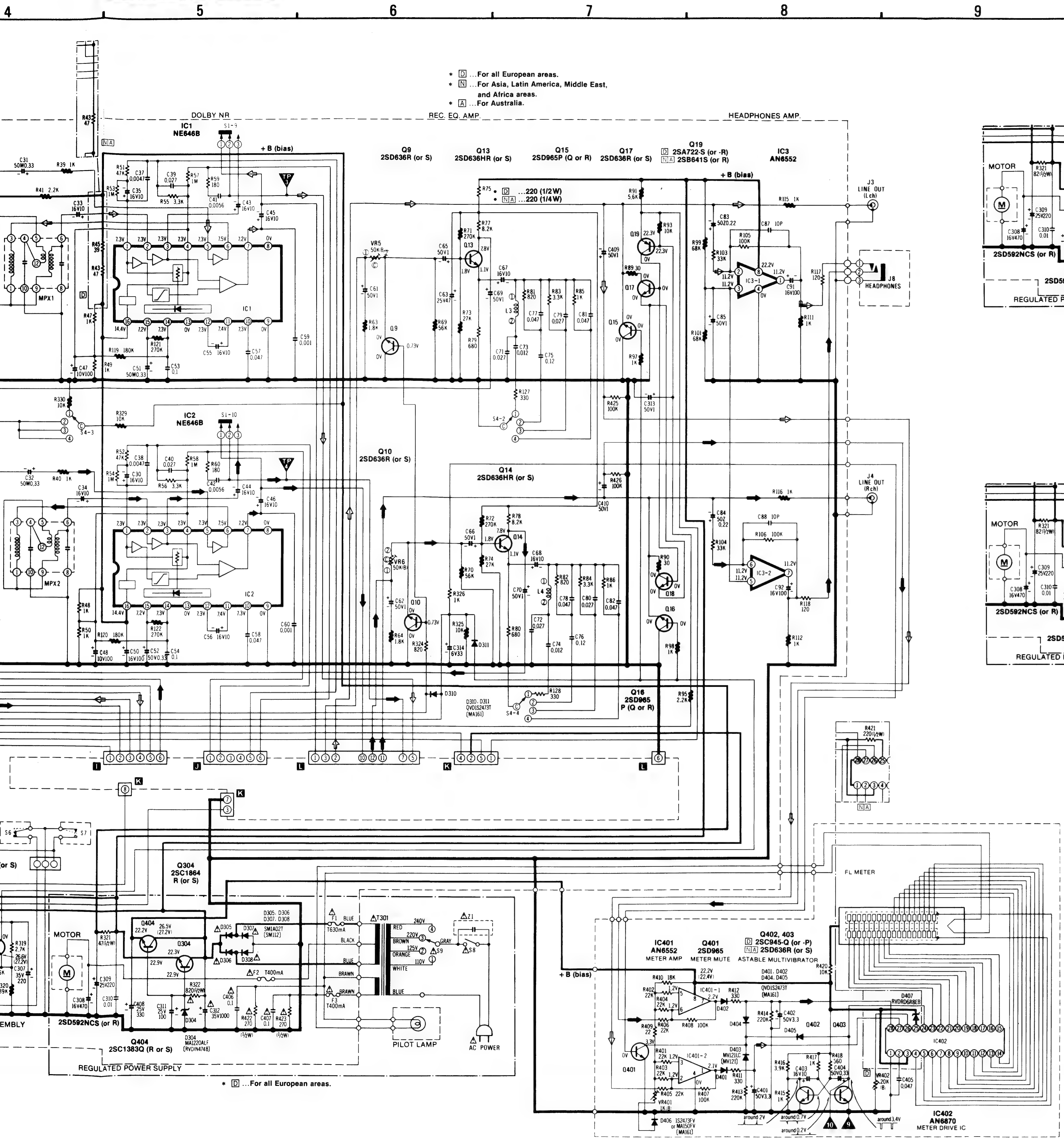
* [D] ...For all European areas.

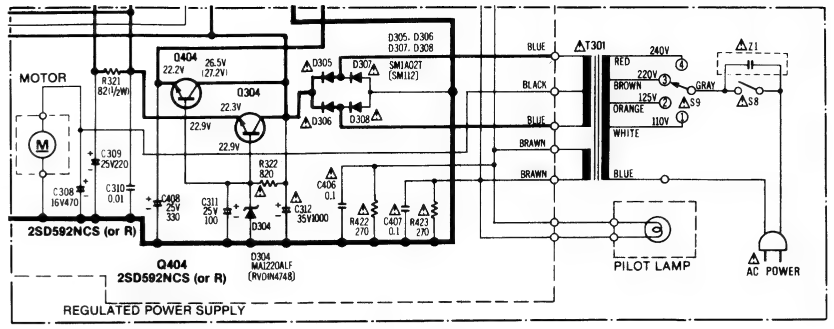
* [N] ...For Asia, Latin America, Middle East and Africa areas.

RS-M240X

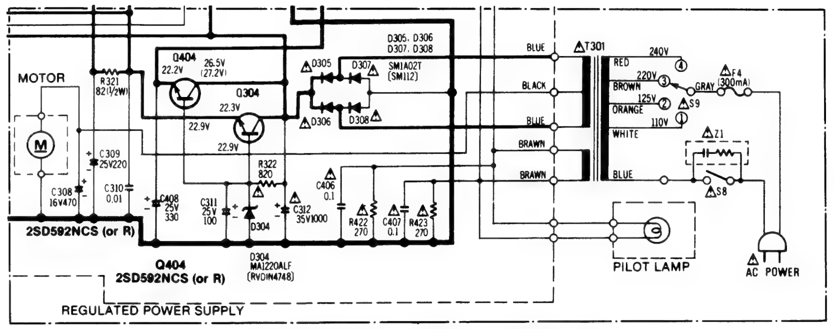
SCHEMATIC DIAGRAM
MAIN AMP SECTION







• [A] ...For Australia.



• [N] ...For Asia, Latin America, Middle East, and Africa areas.

NOTE:
Important safety notice
Components identified by △ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

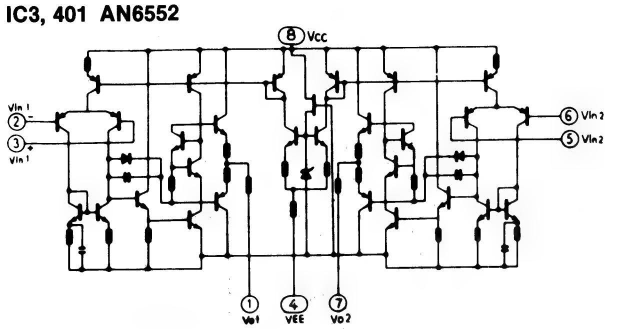
SPECIFICATIONS

• Input level controls ··· MAX

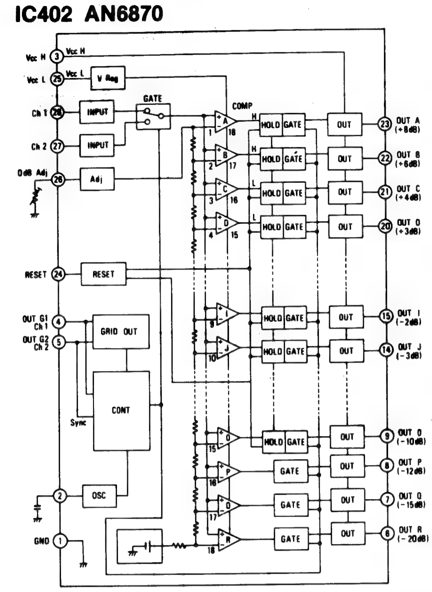
Playback S/N ratio Test tape ··· QZZCFM	Greater than 45 dB
Overall distortion Test tape ··· QZZCRA for Normal ··· QZZCRX for CrO_2 ··· QZZCRY for Fe-Cr ··· QZZCRZ for Metal	Less than 4%
Overall S/N ratio Test tape ··· QZZCRA	Greater than 43 dB (without NAB filter)

EQUIVALENT CIRCUIT

IC3, 401 AN6552



IC402 AN6870



NOTES:

- S1-1—S1-14......Record/Playback select switch (shown in playback position).
- S2-1—S2-4 ......Input select switch (shown in Line position).
- S4-1—S4-4 ......Tape select switch (shown in Normal position). (1...NORMAL, 2...Fe-Cr, 3...CrO_2, 4...METAL)
- S5..................REC MUTE ON/OFF switch (shown in OFF position).
- S6..................Playback muting switch (shown in ON position).
- S7..................Fast wind muting switch (shown in OFF position).
- S8..................Power ON/OFF switch (shown in OFF position).
- S9..................AC power voltage select switch.
- VR1, VR2 ....Playback gain adjustment VR.
- VR3, VR4 ....Input level controls.
- VR5, VR6 ....Overall gain adjustment VR.
- VR7, VR8 ....Bias current adjustment VR (for normal tape).
- VR401 ....FL meter adjustment VR (for 0dB indication).
- VR402 ....FL meter adjustment VR (for −20dB indication).
- L1, L2 ....Bias trap adjustment coil.
- Connection points (A) and (B)...For erase current adjustment points.
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise. 1K = 1,000(Ω), 1M = 1,000k(Ω).
- ( ) indicates printed resistor.
- Capacity are in microfarads (μF) unless specified otherwise. P = Pico-farads.
- The mark (▼) shows test point. e.g. ∇ = Test point 1.
- All voltage values shown in circuitry are under no signal condition and record mode with volume control at minimum position. However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode. For measurement, use VTVM.
- (⇨) this arrow indicates the flow of the playback signal.
- (➡) this arrow indicates the flow of the recording signal.
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.

  e.g. Q1, 3 — Supply parts number 2SD661T

  2SD661T (or U) — Production parts number (2SD661T or 2SD661U)

  D301 QVD1S2473T ← Production parts number; [MA161] ← Supply parts
- The supply parts number is described alone in the replacement parts list.

NOTES: RESISTORS

- ERD ...Carbon
- ERG ...Metal-oxide
- ERS ...Metal-oxide
- ERO ...Metal-film
- ERX ...Metal-film
- ERQ ...Fuse type metallic
- ERC ...Solid
- ERF ...Cement

CAPACITORS

- ECBA ......Ceramic
- ECG□ ......Ceramic
- ECK□ ......Ceramic
- ECC□ ......Ceramic
- ECF□ ......Ceramic
- ECQM......Polyester film
- ECQE ......Polyester film
- ECQF ......Polypropylene
- ECE□ ......Electrolytic
- ECE□N ...Non polar electrolytic
- ECQS ......Polystyrene
- ECS□ ......Tantalum
- QCS ......Tantalum

REPLACEMENT PARTS LIST

Important safety notice

Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.
RESISTORS	
R1, 2	ERD25FJ100
R3, 4	ERD25FJ561
R5, 6	ERD25TJ104
R7, 8	ERD25FJ101
R9, 10	ERD25TJ154
R11, 12	ERD25FJ101
R13, 14	ERD25FJ471
R15, 16	ERD25TJ224
R17, 18	ERD25FJ822
R19, 20	ERD25TJ224
R21, 22, 23, 24	ERD25FJ822
R31, 32	ERD25FJ472
R33, 34	ERD25FJ562
R36	ERD25TJ224
R43 [D]	ERQ14AJ390P
*For all European areas.	
[NA]	ERD25FJ470
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R45 [D]	ERQ14AJ390P
*For all European areas.	
R47, 48, 49, 50	ERD25FJ102
R51, 52	ERD25TJ473
R53, 54	ERD25TJ105
R55, 56	ERD25FJ332
R57, 58	ERD25TJ105
R59, 60	ERD25FJ181
R75 [D]	ERG12ANJ221
*For all European areas.	
[NA]	ERD25FJ221
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R77, 78	ERD25FJ822
R79, 80	ERD25FJ681
R81, 82	ERD25FJ821
R83, 84	ERD25FJ332
R85, 86	ERD25FJ102
R103, 104	ERD25TJ333
R105, 106	ERD25TJ104
R117, 118	ERD25FJ121
R125, 126	ERD25TJ273
R127, 128	ERD25FJ331
R301	ERD25FJ1R0
R304	ERD25FJ392
R305	ERD25FJ821
R306	ERD25FJ152
R307	ERD25FJ821
R308 [D]	ERG12ANJ181
*For all European areas.	
[NA]	ERD25FJ181
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R309 [D]	ERG12ANJ221
*For all European areas.	
[NA]	ERD25FJ221
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R310	ERD25FJ100
R311	ERD25FJ222
R313	ERD25TJ224
R316 [D]	ERQ14AJ121P
*For all European areas.	
[NA]	ERD25FJ121
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R317	ERD25FJ562
R318	ERD25FJ222
R319	ERD25FJ272
R321 [D]	ERQ12HJ470P
*For all European areas.	
[NA]	ERG12ANJ820
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R322 [D] ⚠	ERD50FJ821
*For all European areas.	
[NA] ⚠	ERD25FJ821
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R323	ERD25FJ472
R324	ERD25FJ821
R326	ERD25FJ102
R333 [D]	ERD50FJ560
*For all European areas.	
[NA]	ERD25FJ560
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R334 [D]	ERD50FJ101
*For all European areas.	
[NA]	ERD25FJ101
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R335 [D]	ERD50FJ470
*For all European areas.	
[NA]	ERD25FJ470
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R336	ERD25TJ183
R401, 402, 403, 404, 405, 406	ERD25TJ223
R407, 408	ERD25TJ104
R409	ERD25FJ220
R410	ERD25TJ183
R411, 412	ERD25FJ331
R413, 414	ERD25TJ224
R415	ERD25FJ102
R416	ERD25FJ392
R417	ERD25TJ105
R418	ERD25TJ564
R420	ERD25FJ103
R421 [NA]	ERG12ANJ221
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R422, 423 [D] ⚠	ERD50FJ271
*For all European areas.	
[NA] ⚠	ERD25FJ271
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R425, 426	ERD25TJ104
R603, 604, 605, 606	ERD25TJ474
R607, 608	ERD25FJ101
R611, 612, 613, 614	ERD25TJ224
R615, 616	ERD25TJ474
R617, 618	ERD25FJ472
R619, 620	ERD25TJ333
R621, 622	ERD25FJ103
R623, 624	ERD25TJ824
R625, 626	ERD25FJ822
R627, 628	ERD25TJ393
R629, 630	ERD25TJ683
R631, 632	ERD25TJ333
R633, 634, 635, 636	ERD25FJ103
R637, 638	ERD25FJ221
R639, 640	ERD25FJ332
R641, 642 [D]	ERD50FJ391
*For all European areas.	
[NA]	ERD25FJ391
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R643, 644	ERD25FJ102
R645, 646	ERD25FJ103
R647, 648	ERO25CKG3302
R649, 650, 651, 652	ERD25TJ473
R653, 654	ERD25FJ391
R655, 656	ERD25FJ102
R657, 658	ERO25CKG2200
R659, 660	ERD25TJ224
R661, 662	ERD25FJ472
R663, 664	ERD25FJ390
R665, 666, 667, 668, 669, 670	ERO25CKG2200
R671, 672	ERD25TJ473
R673, 674	ERD25TJ333
R675, 676	ERD25TJ224
R677, 678	ERD25FJ472
R679, 680	ERD25TJ184
R681, 682	ERD25TJ333
R683, 684	ERD25FJ682
R685, 686	ERD25FJ822
R687, 688	ERD25FJ332
R689, 690	ERD25TJ333
R691, 692	ERD25FJ391
R693, 694	ERD25FJ181
R695, 696	ERD25FJ103
R697, 698	ERD25FJ221
R699, 700	ERD25FJ332
R701, 702 [D]	ERD50FJ391
*For all European areas.	
[NA]	ERD25FJ391
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R703, 704	ERD25FJ392
R705, 706	ERD25TJ473
R707, 708	ERO25CKG1002
R709, 710	ERD25TJ225
R711, 712	ERO25CKG2002
R713, 714	ERD25TJ105
R715, 716	ERD25FJ392
R717, 718	ERD25FJ332
R719, 720	ERD25FJ3R3
R721, 722	ERD25TJ564
R723, 724	ERD25FJ103
R725, 726	ERD25TJ224
R727, 728, 729, 730	ERD25FJ103
R731, 732	ERD25TJ104
R733, 734	ERD25TJ105
R735, 736, 737, 738	ERD25TJ473
R739, 740	ERO25CKG3901
R741, 742	ERO25CKG4701
R743, 744	ERO25CKG5100
R745, 746	ERO25CKG4701
R747, 748	ERD25FJ122
R749, 750, 751, 752	ERD25TJ473
R755, 756, 757, 758	ERD25TJ104
R759, 760	ERD25TJ273
R761	ERD25TJ153
R762	ERD25TJ104
R763, 764	ERD25TJ473
R766, 767	ERD25TJ473
R768	ERD25FJ682
R770	ERD25FJ222
R772, 773, 774	ERD25TJ473
R776	ERD25TJ684
R777	ERD25TJ473
R778	ERD25FJ392
R779, 780	ERD25TJ393
R781	ERD25FJ272
R782 [D]	ERQ14AJ101
*For all European areas.	
[NA]	ERD25FJ151
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R783	ERD25FJ221
R784, 785, 786	ERD25FJ472
R787, 788	ERD25TJ473
R789, 790 [D]	ERG1ANJ221
*For all European areas.	
[NA]	ERD25FJ221
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R791, 792	ERD25FJ390
R793	ERD25FJ222
R795, 796	ERD25FJ562
R797, 798	ERD25FJ471
R799, 800	ERD25FJ222
R801, 802 [D]	ERD25FJ821
*For all European areas.	
[NA]	ERD25FJ100
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R803	ERD25FJ472
R804	ERD25FJ1R0
R805, 806	ERD25FJ103
R807, 808, 809, 810	ERD25TJ225
R811	ERD25FJ822
VARIABLE RESISTORS	
VR1, 2	EVNM4AA00B24
VR3, 4	QVKDM80RA24
VR5, 6, 7, 8	EVNM4AA00B54
VR401	EVNM4AA00B13
VR402	EVNM4AA00B24
VR601, 602	EVNM4AA00B54
VR603, 604	EVNM4AA00B14
VR605, 606, 607, 608, 609, 610	EVNM4AA00B54
CAPACITORS	
C3, 4	ECEA16M10R
C6	ECEA1ES470
C7, 8	ECCD1H331KD
C9, 10	ECFDD102KVY
C11, 12	ECEA1CS330
C13, 14	ECQM1H153JZ
C15, 16	ECKD1H681KB
C17, 18	ECQP1152JZ
C19, 20	ECFDD562KVY
C21, 22	ECFDD102KVY
C23, 24	ECEA1CS330
C25, 26	ECEA25Z4R7
C29, 30	ECQM1H123KZ
C31, 32	ECEA50MR33R
C33, 34, 35, 36	ECEA1HS100
C37, 38	ECQM1H472JZ
C39, 40	ECQM1H273JZ
C41, 42	ECQM1H562JZ
C43, 44, 45, 46	ECEA1HS100
C47, 48	ECEA1AS101
C50	ECEA1ES101
C51, 52	ECEA50MR33R
C53, 54	ECFDD104KXY
C55, 56	ECEA1HS100
C57, 58	ECFDD473KXY
C59, 60	ECKD1H102MD
C61, 62	ECEA50Z1
C63	ECEA1ES470
C65, 66	ECEA50Z1
C67, 68	ECEA1HS100
C69, 70	ECEA50Z1
C71, 72	ECQM1H273JZ
C73, 74	ECQM1H123KZ
C75, 76	ECQM1H124JZ
C77, 78	ECQM1H473KZ
C79, 80	ECQM1H273KZ
C81, 82	ECQM1H473KZ
C83, 84	ECEA50ZR22
C85	ECEA50Z1
C87, 88	ECCD1H100KC
C91, 92	ECEA1ES101
C93, 94	ECCD1H101KD
C301	ECQP1183JZ
C302	ECQM1H153JZ
C303	ECEA1ES470
C304	ECQM1H822KZ
C305	ECEA1HS470
C306	ECEA50Z2R2
C307	ECEA1VS221
C308	ECEA1CS471
C309	ECEA1VS102
C310	ECQM1H103KZ
C311	ECEA1ES221
C312 ⚠	ECEA1VS222
C313	ECEA50Z1
C314	ECEA1CS330
C401, 402	ECEA50Z3R3
C403	ECEA1HS100
C404	ECEA50ZR33
C405	ECFDD473KXY
C406, 407 ⚠	ECFDD104KXY
C408	ECEA1ES331
C409, 410	ECEA50Z1
C601, 602	ECEA16M10R
C603, 604, 605, 606	ECEA50M1R
C607, 608	ECEA1HS100
C609, 610	ECEA1CS221
C611, 612	ECQV05823JZ
C613, 614	ECQV05104JZ
C615, 616	ECEA25Z4R7
C617, 618	ECQM1H122JZ
C619, 620	ECCD1H121KD
C621, 622	ECQM1H122JZ
C623, 624	ECQV05474JZ
C625, 626	ECCD1H221KD
C627, 628	ECQM1H103JZ
C629, 630	ECQM1H102JZ
C631, 632, 633, 634	ECCD1H101KD
C635, 636	ECQM1H103JZ
C637, 638	ECEA1HS100
C639, 640, 641, 642	ECQV05104JZ
C643, 644	ECQM1H332JZ
C645, 646	ECCD1H331KD
C647, 648	ECQM1H332JZ
C649, 650	ECEA1CS221
C651, 652	ECQM1H103JZ
C653, 654	ECQV05104JZ
C655, 656	ECQM1H102JZ
C657, 658	ECEA16M22RK
C659, 660, 661, 662, 663, 664	ECEA25Z4R7
C665	ECEA1VS221
C666	ECEA1ES101
C667, 668	ECEA1HS100
C669	ECEA50Z2R2
C670	ECEA50Z1
SPARK KILLER	
Z1 [DA] ⚠	QCR0011
*For all European areas and Australia.	
[N] ⚠	QCR0008
*For Asia, Latin America, Middle East and Africa areas.	
DIODES & RECTIFIERS	
D301, 302, 303	MA161
D304	RVD1N4748
D305, 306, 307, 308 ⚠	SM112
D310, 311	MA161
D313	TLR205
D314	MA161
D401, 402	MA161
D403	MV121
D404, 405, 406	MA161
D407 [D]	RVDRD6R8EB
*For all European areas.	
D601, 602, 603, 604, 605, 606, 607, 608, 609, 610	MA161
D615, 616, 617, 618, 619, 620	MA161
D621	RVDRD6R8EB
D622, 623, 624	MA161
D625	RVDRD6R8EB
TRANSISTORS	
Q1, 2, 3, 4	2SD661T
Q5, 6, 7, 8, 9, 10	2SD636R
Q13, 14	2SD636HR
Q15, 16	2SD965P
Q17, 18	2SD636R
Q19 [D]	2SA722-S
*For all European areas.	
[NA]	2SB641S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q301	2SD592NCS
Q302 [D]	2SC945-Q
*For all European areas.	
[NA]	2SD636R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q303	2SB641S
Q304	2SC1846R
Q401	2SD965P
Q402, 403 [D]	2SC945-Q
*For all European areas.	
[NA]	2SD636R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q404 [D]	2SC1383Q
*For all European areas.	
[NA]	2SD592NCS
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q601, 602	2SK104F
Q603, 604 [D]	2SC945-Q
*For all European areas.	
[NA]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q605, 606, 607, 608	2SD1010R
Q609, 610	2SK30AO
Q611, 612 [D]	2SC1328-S
*For all European areas.	
[NA]	2SD661T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q613, 614 [D]	2SA772-S
*For all European areas.	
[NA]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q615, 616, 617, 618	2SD1010R
Q619, 620 [D]	2SC945-Q
*For all European areas.	
[NA]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q621, 622	2SK30AO
Q623, 624 [D]	2SC1328-S
*For all European areas.	
[NA]	2SD661T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q625, 626 [D]	2SA722-S
*For all European areas.	
[NA]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q627, 628	2SK68AM
Q629, 630, 631, 632, 633, 634, 635, 636	2SK104F
Q637, 638, 639, 640, 641 [D]	2SC945-Q
*For all European areas.	
[NA]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q642 [D]	2SA722-S
*For all European areas.	
[NA]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q643, 644 [D]	2SC945-Q
*For all European areas.	
[NA]	2SC2021SF
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q645 [D]	2SD880Y
*For all European areas.	
[NA]	2SC1846R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q646 [D]	2SC1318-R
*For all European areas.	
[NA]	2SD638S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q647 [D]	2SA720-R
*For all European areas.	
[NA]	2SB644Q
*For Asia, Latin America, Middle East, Africa areas and Australia.	
INTEGRATED CIRCUITS	
IC1, 2	NE646B
IC3	AN6552
IC401	AN6552
IC402	AN6870
IC601, 602	BA651
IC603, 604	BA652
IC605, 606	AN6552
IC607, 608	NJM4558DF
IC609	AN6552

Ref. No.	Part No.	Part Name & Description
TRANSFORMER		
T301 [DA] ⚠	QLPD54ELC	AC Power Transformer
*For all European areas and Australia.		
[N] ⚠	QLPN65ELC	〃
*For Asia, Latin America, Middle East and Africa areas.		
COILS		
L1, 2	QLQC0331	Bias Trap Coil
L3, 4	QLQX0332K	Peaking Coil
L301	QLB0198K	Bias Oscillation Coil
MPX1, 2	QLM9Z7	Multiplex Filter
SWITCHES		
S1-1—1-14	QSSE203	Slide Switch (Record/Playback Selector)
S2-1—2-4	QSWY203	Push Switch (Input Selector)
S4-1—4-4	QSR4405	Rotary Switch (Tape Selector)
S5	QSWY203	Push Switch (REC MUTE)
S6	QSB0251i	Leaf Switch (Playback M
S7	QSB0251i	Leaf Switch (Fast Wind M
S8 ⚠	QSW1117AS	Push Switch (Power ON/
S9 ⚠	QSR1407H	Rotary Switch (AC Power Voltage Selec
S10-1—10-5	ESA26133	Slide Switch (NR Selecto
FUSES		
F1 [D] ⚠	XBAQ0008	Fuse (T 630mA)
*For all European areas.		
F2, 3 [D] ⚠	XBAQ0007	Fuse (T 400mA)
*For all European areas.		
F4 [N] ⚠	XBA2E03NR5	Fuse (300mA)
*For Asia, Latin America, Middle East and Africa areas.		
JACKS		
J1, 2, 3, 4	QEJ5003S	Jack Board Assembly
J5, 6	QJA0257	Microphone Jack
J8	QJA0249	Headphones Jack

8 7 6 5 4

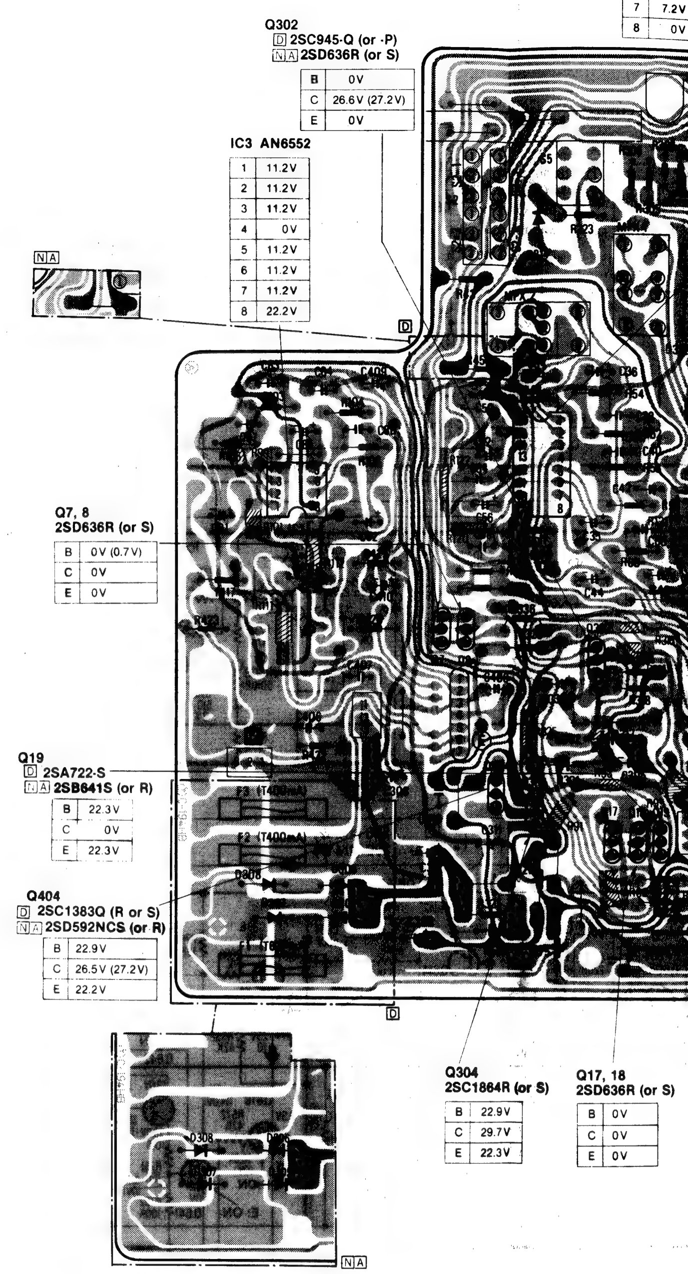
CIRCUIT BOARDS
MAIN AMP CIRCUIT BOARD

NOTES:

- The circuit shown in ▬ on the conductor is +B (bias) circuit.
- The circuit shown in ▬ on the conductor indicates printed circuit, which is included printed type resistors.
- The circuit shown in ▬ on the conductor indicates printed circuit on the back side of the printed circuit board.
- The symbols (•) indicate connection points between conductors on the front side and back side of the circuit board.
- Values indicated in ▭ are under no signal condition and record mode with volume control at minimum position. However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode. For measurement, use VTVM.
- Described in the circuit board diagram are two types of numbers; the supply parts number and production parts number for transistors. One type of number is used for supply parts number and production parts number when they are identical.

  e.g. Q1, 3 — Supply parts number 2SD661T

  2SD661T (or U) — Production parts number (2SD661T or 2SD661U)
- **The supply parts number is described alone in the replacement parts list.**
- [D] ...For all European areas.
- [N] ...For Asia, Latin America, Middle East, and Africa areas.
- [A] ...For Australia.



ECQF ......Polypropylene
ECE□ ......Electrolytic
ECE□N ...Non polar electrolytic
ECQS ......Polystyrene
ECS□ ......Tantalum
QCS ......Tantalum

ortant for safety.
s specified parts.

Part No.
tin America,
, Africa areas
a.
D25FJ102
D25FJ103
025CKG3302
652
D25TJ473
D25FJ391
D25FJ102
025CKG2200
D25TJ224
D25FJ472
D25FJ390
568, 669, 670
025CKG2200
025TJ473
D25TJ333
D25TJ224
D25FJ472
D25TJ184
D25TJ333
D25FJ682
D25FJ822
D25FJ332
D25TJ333
D25FJ391
D25FJ181
D25FJ103
D25FJ221
D25FJ332
050FJ391
ean areas.
D25FJ391
n America,
Africa areas
a.
025FJ392
025TJ473
25CKG1002
25TJ225
25CKG2002
25TJ105
25FJ392
25FJ332
25FJ3R3
25TJ564
25FJ103
25TJ224
30
25FJ103
25TJ104
25TJ105
38
25TJ473
25CKG3901
25CKG4701
25CKG5100
25CKG4701
25FJ122
52
25TJ473
58
25TJ104
25TJ273
25TJ153
25TJ104
25TJ473
25TJ473
25FJ682
25FJ222
25TJ473
25TJ684
25TJ473
25FJ392

Ref. No.	Part No.
R779, 780	ERD25TJ393
R781	ERD25FJ272
R782 [D]	ERQ14AJ101
*For all European areas.	
[N][A]	ERD25FJ151
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R783	ERD25FJ221
R784, 785, 786	ERD25FJ472
R787, 788	ERD25TJ473
R789, 790 [D]	ERG1ANJ221
*For all European areas.	
[N][A]	ERD25FJ221
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R791, 792	ERD25FJ390
R793	ERD25FJ222
R795, 796	ERD25FJ562
R797, 798	ERD25FJ471
R799, 800	ERD25FJ222
R801, 802 [D]	ERD25FJ821
*For all European areas.	
[N][A]	ERD25FJ100
*For Asia, Latin America, Middle East, Africa areas and Australia.	
R803	ERD25FJ472
R804	ERD25FJ1R0
R805, 806	ERD25FJ103
R807, 808, 809, 810	ERD25TJ225
R811	ERD25FJ822
VARIABLE RESISTORS	
VR1, 2	EVNM4AA00B24
VR3, 4	QVKDM80RA24
VR5, 6, 7, 8	EVNM4AA00B54
VR401	EVNM4AA00B13
VR402	EVNM4AA00B24
VR601, 602	EVNM4AA00B54
VR603, 604	EVNM4AA00B14
VR605, 606, 607, 608, 609, 610	EVNM4AA00B54
CAPACITORS	
C3, 4	ECEA16M10R
C6	ECEA1ES470
C7, 8	ECCD1H331KD
C9, 10	ECFDD102KVY
C11, 12	ECEA1CS330
C13, 14	ECQM1H153JZ
C15, 16	ECKD1H681KB
C17, 18	ECQP1152JZ
C19, 20	ECFDD562KVY
C21, 22	ECFDD102KVY
C23, 24	ECEA1CS330
C25, 26	ECEA25Z4R7
C27, 28	ECQM1H123KZ
C31, 32	ECEA50MR33R
C33, 34, 35, 36	ECEA1HS100
C37, 38	ECQM1H472JZ
C39, 40	ECQM1H273JZ
C41, 42	ECQM1H562JZ
C43, 44, 45, 46	ECEA1HS100
C47, 48	ECEA1AS101
C50	ECEA1ES101
C51, 52	ECEA50MR33R
C53, 54	ECFDD104KVY
C55, 56	ECEA1HS100
C57, 58	ECFDD473KXY

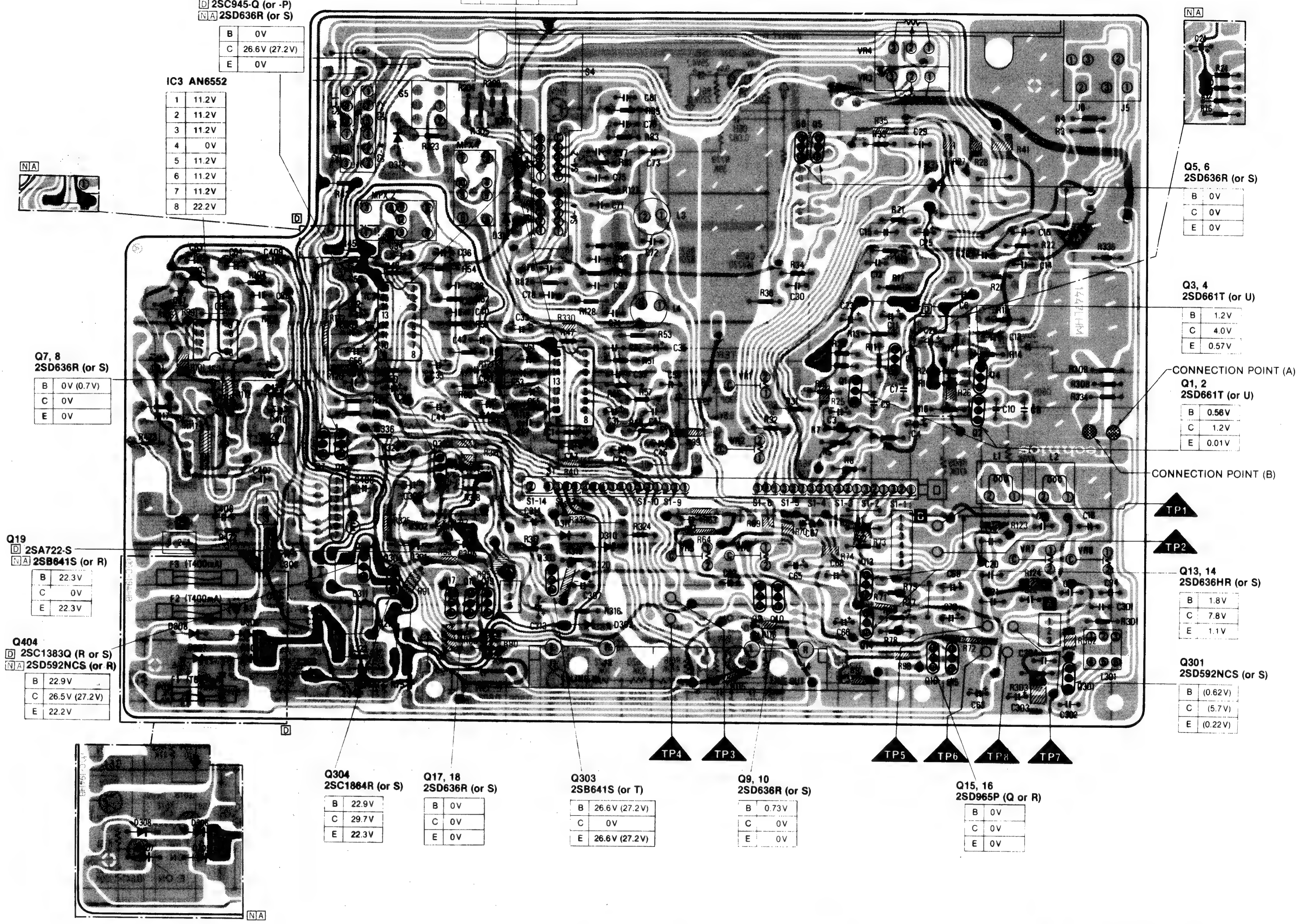
Ref. No.	Part No.
C59, 60	ECKD1H102MD
C61, 62	ECEA50Z1
C63	ECEA1ES470
C65, 66	ECEA50Z1
C67, 68	ECEA1HS100
C69, 70	ECEA50Z1
C71, 72	ECQM1H273JZ
C73, 74	ECQM1H123KZ
C75, 76	ECQM1H124JZ
C77, 78	ECQM1H473KZ
C79, 80	ECQM1H273KZ
C81, 82	ECQM1H473KZ
C83, 84	ECEA50ZR22
C85	ECEA50Z1
C87, 88	ECCD1H100KC
C91, 92	ECEA1ES101
C93, 94	ECCD1H101KD
C301	ECQP1183JZ
C302	ECQM1H153JZ
C303	ECEA1ES470
C304	ECQM1H822KZ
C305	ECEA1HS470
C306	ECEA50Z2R2
C307	ECEA1VS221
C308	ECEA1CS471
C309	ECEA1VS102
C310	ECQM1H103KZ
C311	ECEA1ES221
C312 △	ECEA1VS222
C313	ECEA50Z1
C314	ECEA1CS330
C401, 402	ECEA50Z3R3
C403	ECEA1HS100
C404	ECEA50ZR33
C405	ECFDD473KXY
C406, 407 △	ECFDD104KXY
C408	ECEA1ES331
C409, 410	ECEA50Z1
C601, 602	ECEA16M10R
C603, 604, 605, 606	ECEA50M1R
C607, 608	ECEA1HS100
C609, 610	ECEA1CS221
C611, 612	ECQV05823JZ
C613, 614	ECQV05104JZ
C615, 616	ECEA25Z4R7
C617, 618	ECQM1H122JZ
C619, 620	ECCD1H121KD
C621, 622	ECQM1H122JZ
C623, 624	ECQV05474JZ
C625, 626	ECCD1H221KD
C627, 628	ECQM1H103JZ
C629, 630	ECQM1H102JZ
C631, 632, 633, 634	ECCD1H101KD
C635, 636	ECQM1H103JZ
C637, 638	ECEA1HS100
C639, 640, 641, 642	ECQV05104JZ
C643, 644	ECQM1H332JZ
C645, 646	ECCD1H331KD
C647, 648	ECQM1H332JZ
C649, 650	ECEA1CS221
C651, 652	ECQM1H103JZ
C653, 654	ECQV05104JZ
C655, 656	ECQM1H102JZ
C657, 658	ECEA16M22RK
C659, 660, 661, 662, 663, 664	ECEA25Z4R7
C665	ECEA1VS221
C666	ECEA1ES101
C667, 668	ECEA1HS100
C669	ECEA50Z2R2
C670	ECEA50Z1

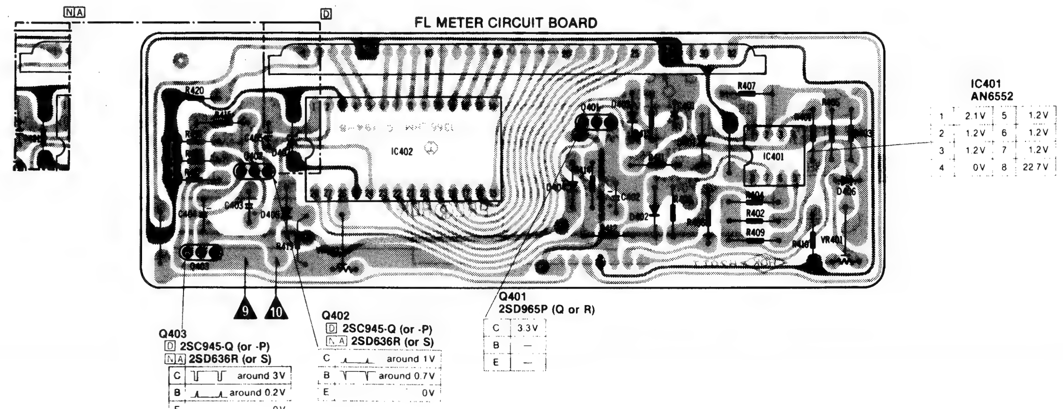
Ref. No.	Part No.
SPARK KILLER	
Z1 [D][A] △	QCR0011
*For all European areas and Australia.	
[N] △	QCR0008
*For Asia, Latin America, Middle East and Africa areas.	
DIODES & RECTIFIERS	
D301, 302, 303	MA161
D304	RVD1N4748
D305, 306, 307, 308 △	SM112
D310, 311	MA161
D313	TLR205
D314	MA161
D401, 402	MA161
D403	MV121
D404, 405, 406	MA161
D407 [D]	RVDRD6R8EB
*For all European areas.	
D601, 602, 603, 604, 605, 606, 607, 608, 609, 610	MA161
D615, 616, 617, 618, 619, 620	MA161
D621	RVDRD6R8EB
D622, 623, 624	MA161
D625	RVDRD6R8EB
TRANSISTORS	
Q1, 2, 3, 4	2SD661T
Q5, 6, 7, 8, 9, 10	2SD636R
Q13, 14	2SD636HR
Q15, 16	2SD965P
Q17, 18	2SD636R
Q19 [D]	2SA722-S
*For all European areas.	
[N][A]	2SB641S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q301	2SD592NCS
Q302 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SD636R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q303	2SB641S
Q304	2SC1846R
Q401	2SD965P
Q402, 403 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SD636R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q404 [D]	2SC1383Q
*For all European areas.	
[N][A]	2SD592NCS
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q601, 602	2SK104F
Q603, 604 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	

CIRCUIT BOARDS
MAIN AMP CIRCUIT BOARD

NOTES:
- The circuit shown in ▬ on the conductor is +B (bias) circuit.
- The circuit shown in ▬ on the conductor indicates printed circuit, which is included printed type resistors.
- The circuit shown in ▬ on the conductor indicates printed circuit on the back side of the printed circuit board.
- The symbols (•) indicate connection points between conductors on the front side and back side of the circuit board.
- Values indicated in ▭ are under no signal condition and record mode with volume control at minimum position.
  However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode.
  For measurement, use VTVM.
- Described in the circuit board diagram are two types of numbers; the supply parts number and production parts number for transistors.
  One type of number is used for supply parts number and production parts number when they are identical.
  e.g. Q1, 3 — Supply parts number 2SD661T
  2SD661T (or U) — Production parts number (2SD661T or 2SD661U)
- **The supply parts number is described alone in the replacement parts list.**
- [D] ...For all European areas.
- [N] ...For Asia, Latin America, Middle East and Africa areas.
- [A] ...For Australia.

Ref. No.	Part No.
Q605, 606, 607, 608	2SD1010R
Q609, 610	2SK30AO
Q611, 612 [D]	2SC1328-S
*For all European areas.	
[N][A]	2SD661T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q613, 614 [D]	2SA772-S
*For all European areas.	
[N][A]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q615, 616, 617, 618	2SD1010R
Q619, 620 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q621, 622	2SK30AO
Q623, 624 [D]	2SC1328-S
*For all European areas.	
[N][A]	2SD661T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q625, 626 [D]	2SA722-S
*For all European areas.	
[N][A]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q627, 628	2SK68AM
Q629, 630, 631, 632, 633, 634, 635, 636	2SK104F
Q637, 638, 639, 640, 641 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SC2021S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q642 [D]	2SA722-S
*For all European areas.	
[N][A]	2SB641T
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q643, 644 [D]	2SC945-Q
*For all European areas.	
[N][A]	2SC2021SF
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q645 [D]	2SD880Y
*For all European areas.	
[N][A]	2SC1846R
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q646 [D]	2SC1318-R
*For all European areas.	
[N][A]	2SD638S
*For Asia, Latin America, Middle East, Africa areas and Australia.	
Q647 [D]	2SA720-R
*For all European areas.	
[N][A]	2SB644Q
*For Asia, Latin America, Middle East, Africa areas and Australia.	
INTEGRATED CIRCUITS	
IC1, 2	NE646B
IC3	AN6552
IC401	AN6552
IC402	AN6870
IC601, 602	BA651
IC603, 604	BA652
IC605, 606	AN6552
IC607, 608	NJM4558DF
IC609	AN6552



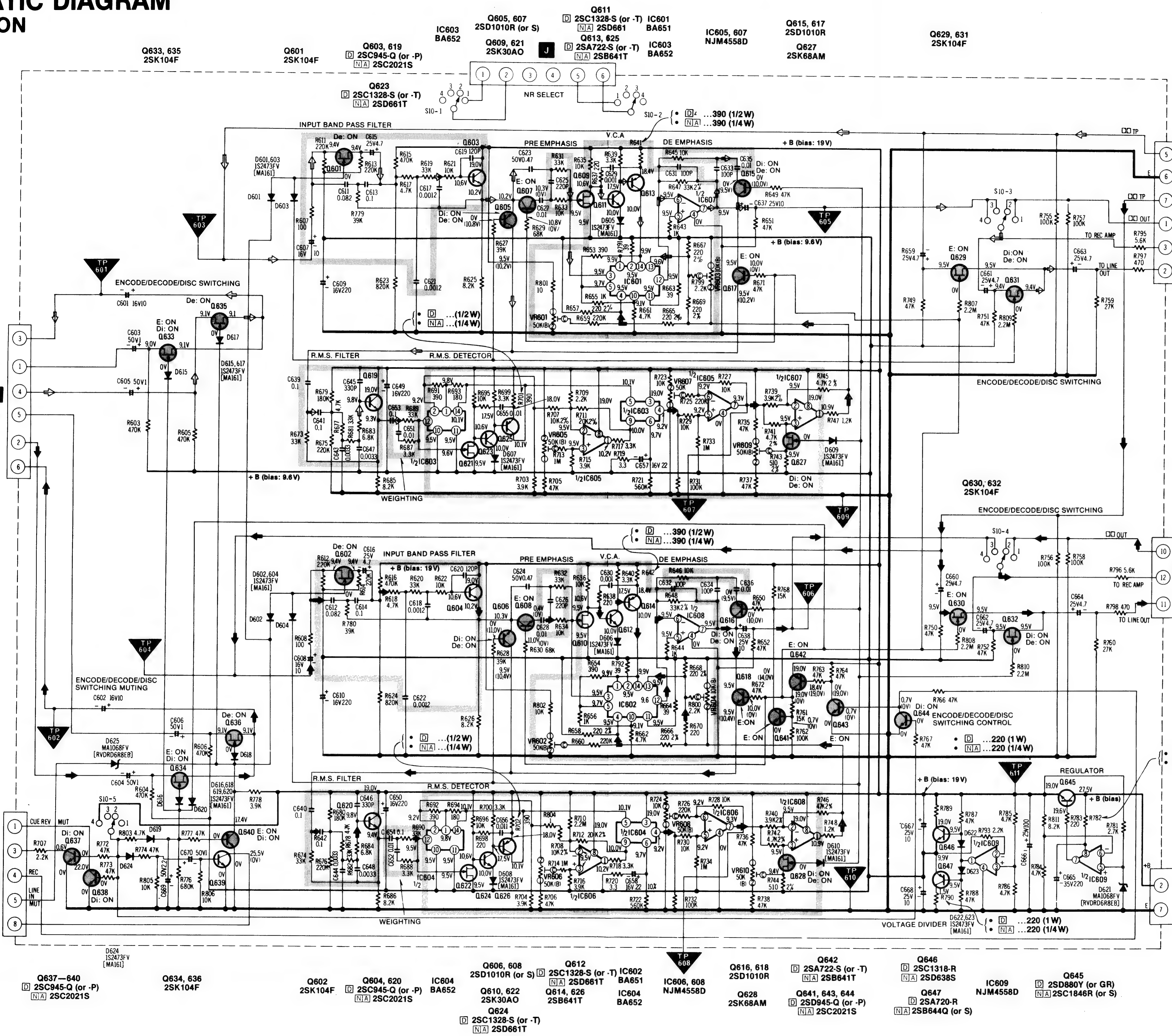


Ref. No.	Part No.	Part Name & Description
TRANSFORMER		
T301 [D][A] △	QLPD54ELC	AC Power Transformer
*For all European areas and Australia.		
[N] △	QLPN65ELC	〃
*For Asia, Latin America, Middle East and Africa areas.		
COILS		
L1, 2	QLQC0331	Bias Trap Coil
L3, 4	QLQX0332K	Peaking Coil
L301	QLB0198K	Bias Oscillation Coil
MPX1, 2	QLM9Z7	Multiplex Filter
SWITCHES		
S1-1-1-14	QSSE203	Slide Switch (Record/Playback Selector)
S2-1-2-4	QSWY203	Push Switch (Input Selector)
S4-1-4-4	QSR4405	Rotary Switch (Tape Selector)
S5	QSWY203	Push Switch (REC MUTE)

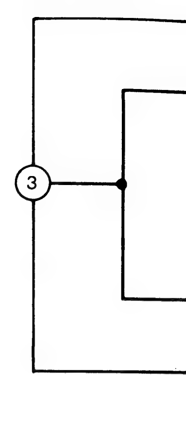
Ref. No.	Part No.	Part Name & Description
S6	QSB0251i	Leaf Switch (Playback Muting)
S7	QSB0251i	Leaf Switch (Fast Wind Muting)
S8 △	QSW1117AS	Push Switch (Power ON/OFF)
S9 △	QSR1407H	Rotary Switch (AC Power Voltage Selector)
S10-1-10-5	ESA26133	Slide Switch (NR Selector)
FUSES		
F1 [D][A]	XBAQ0008	Fuse (T 630mA)
*For all European areas.		
F2, 3 [D][A]	XBAQ0007	Fuse (T 400mA)
*For all European areas.		
F4 [N][A]	XBA2E03NR5	Fuse (300mA)
*For Asia, Latin America, Middle East and Africa areas.		
JACKS		
J1, 2, 3, 4	QEJ5003S	Jack Board Assembly
J5, 6	QJA0257	Microphone Jack
J8	QJA0249	Headphones Jack

RS-M240X

SCHEMATIC DIAGRAM
dbx SECTION



IC601, 602



NOTES:

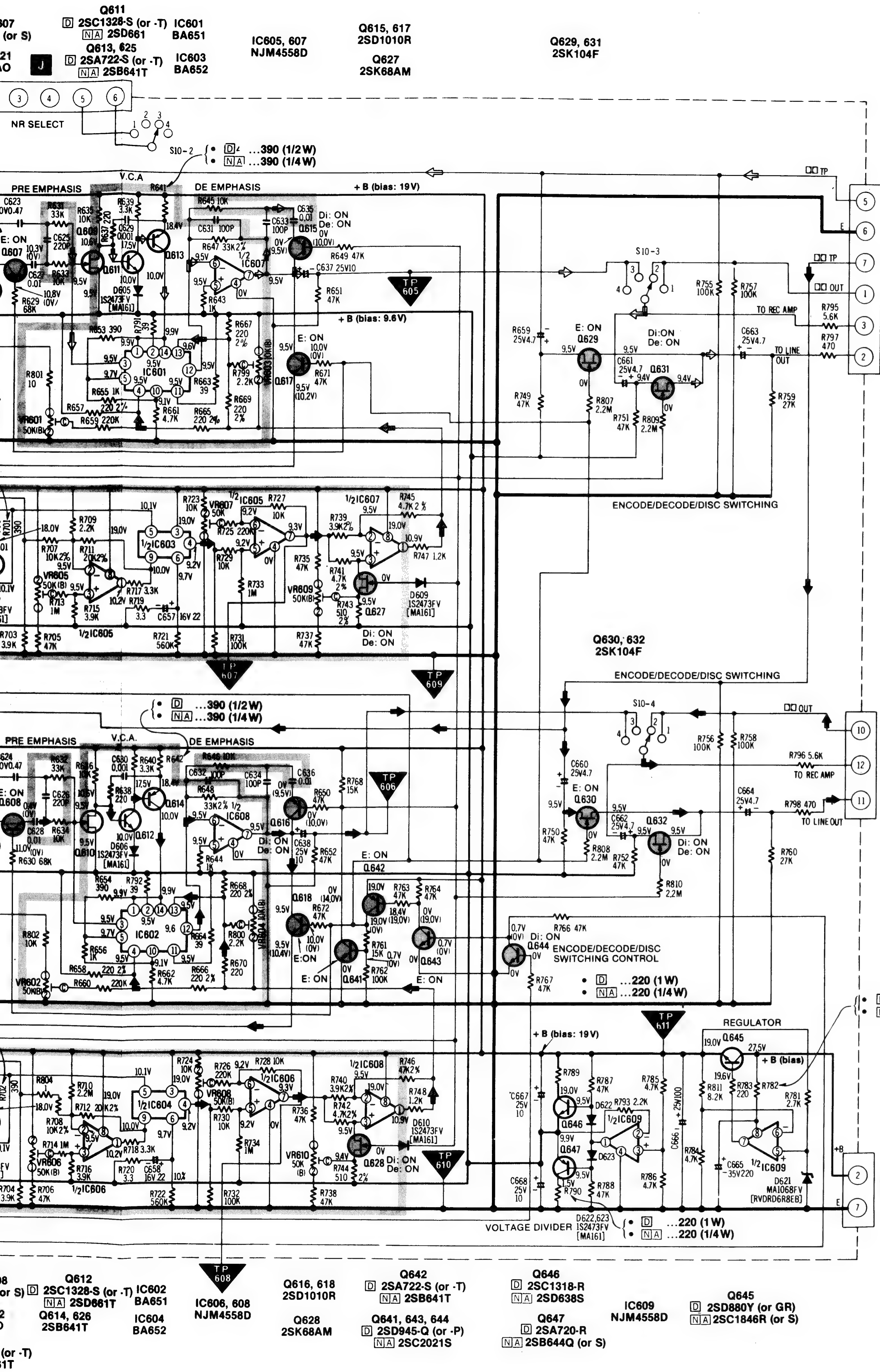
- S10-1—S10-5 ......Noise reduction select switch (sh
  (1...Dolby IN, 2...OUT, 3...dbx tap
- VR601, VR602......VCA distortion adjustment VR.
- VR603, VR604......VCA distortion adjustment VR.
- VR605, VR606......RMS distortion adjustment VR.
- VR607, VR608......dbx standard input level adjustme
- VR609, VR610......dbx standard level adjustment VF
- Resistance are in ohms (Ω), 1/4 watt unless specifie
  1K = 1,000(Ω), 1M = 1,000k(Ω).
- Capacity are in microfarads (μF) unless specified ot
  P = Pico-farads.
- The mark (▼) shows test point. e.g. ▼ = Test point 1
- All voltage values shown in circuitry are under no si
  control at minimum position.
  However, the voltage in playback mode is indicated
  mode.
  For measurement, use TVTM.
- (⇨) this arrow indicates the flow of the playbac
- (➡) this arrow indicates the flow of the recordi
- (▨▷) this arrow indicates the flow V.C.A. control
- Described in the schematic diagram are two types o
  production parts number for transistors and diodes.
  One type of number is used for supply parts numbe
  identical.

e.g. Q605 — Supply parts number 2SD1010R

2SD1010R (or S) — Production parts numb 2SD1010R or 2SD1010S

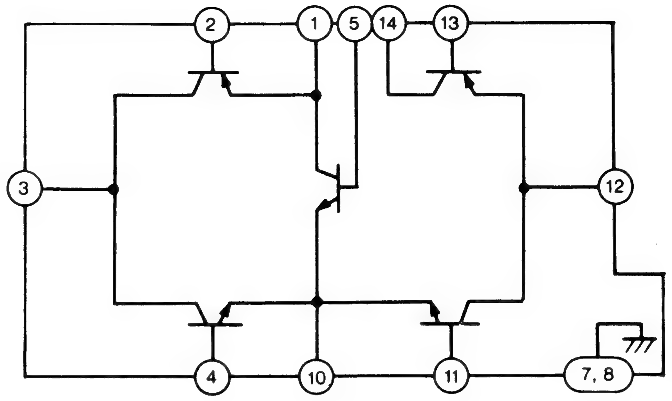
D605
1S2473FV ← Production parts numb
[MA161] ← Supply parts number

- The supply parts number is described alone in the r

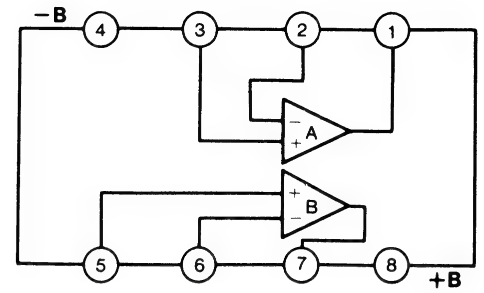


EQUIVALENT CIRCUIT

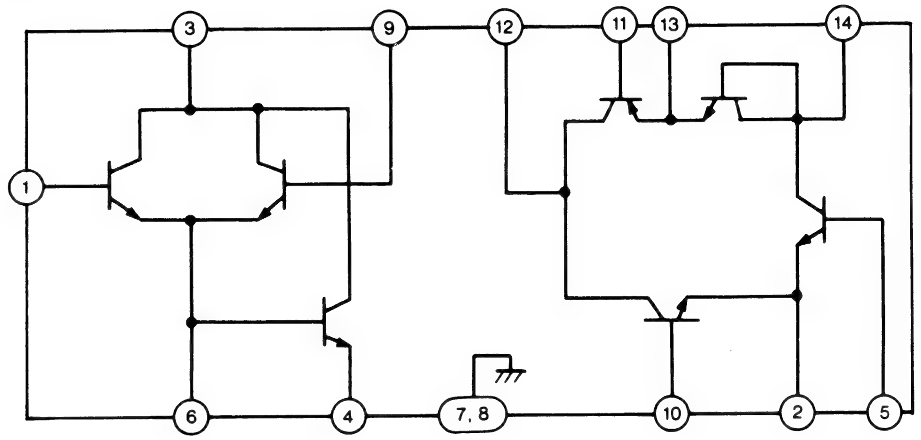
IC601, 602



IC605, 606, 607, 608, 609



IC603, 604



NOTES:

- S10-1—S10-5 ......Noise reduction select switch (shown in OUT position).
  (1...Dolby IN, 2...OUT, 3...dbx tape, 4...dbx disc)
- VR601, VR602......VCA distortion adjustment VR.
- VR603, VR604......VCA distortion adjustment VR.
- VR605, VR606......RMS distortion adjustment VR.
- VR607, VR608......dbx standard input level adjustment VR (Encode).
- VR609, VR610......dbx standard level adjustment VR (Decode).
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
  1K = 1,000(Ω), 1M = 1,000k(Ω).
- Capacity are in microfarads (μF) unless specified otherwise.
  P = Pico-farads.
- The mark (▼) shows test point. e.g. ▼ = Test point 1.
- All voltage values shown in circuitry are under no signal condition and record mode with volume control at minimum position.
  However, the voltage in playback mode is indicated in (   ) when it differs from that in record mode.
  For measurement, use TVTM.
- (⇨) this arrow indicates the flow of the playback signal.
- (➡) this arrow indicates the flow of the recording signal.
- (▨) this arrow indicates the flow V.C.A. control signal.
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes.
  One type of number is used for supply parts number and production parts number when they are identical.

  e.g. **Q605** — **Supply parts number 2SD1010R**

  2SD1010R (or S)

  Production parts number 2SD1010R or 2SD1010S

  D605
  1S2473FV ← **Production parts number**
  [MA161] ← **Supply parts number**
- **The supply parts number is described alone in the replacement parts list.**

- (2%) presents allowable resistance range of resistor used.
  e.g. R665 220 (2%) → 220±4.4(Ω)
- Marks ● and ● represent the switching transistors for encode, decode and disc modes in the dbx circuit. ON modes of respective transistors are indicated by symbols as shown below. (They are OFF for other modes.)

  E.ON
  e.g. "E.ON" shows ON condition during Encode mode. →

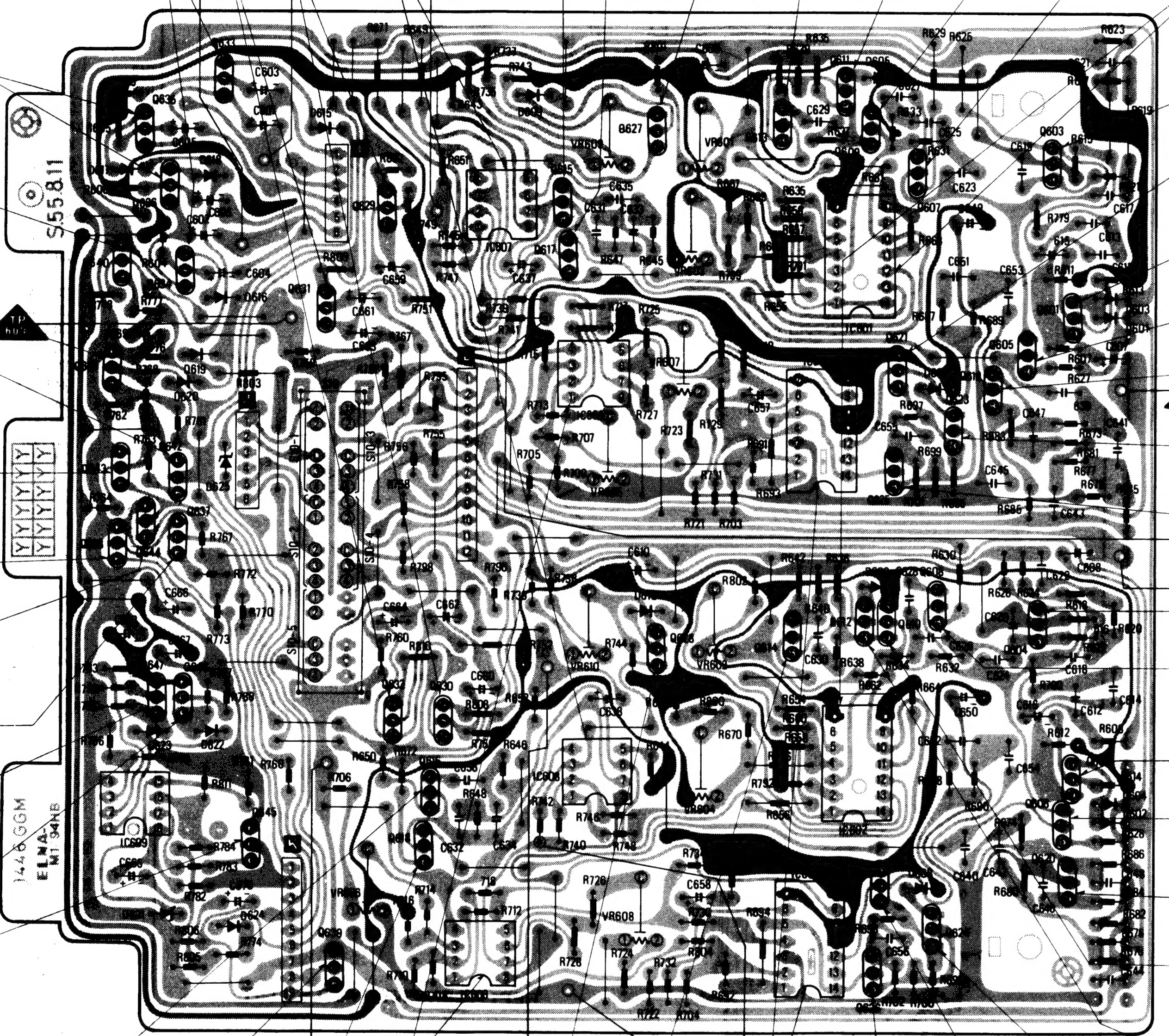
  De.ON
  "De.ON" shows ON condition during Decode mode. →

  Di.ON
  "Di.ON" shows ON condition during Disc mode. →
- Circuit constructions for encoding, decoding and disc are different as shown in page 10.

- Ⓓ ...For all European areas.
- Ⓝ ...For Asia, Latin America, Middle East, and Africa areas.
- Ⓐ ...For Australia.

6 5 4 3 2 1 | 11 10 9

dbx CIRCUIT BOARD



IC607, 608 NJM4558D

Pin	V
1	10.9V
2	9.5V
3	9.5V
4	—
5	9.5V
6	9.5V
7	9.5V
8	19.0V

Q633, 634 2SK104F

G	0V
S	9.1V
D	9.1V

Q631, 632 2SK104F

G	0V
S	9.4V
D	9.4V

Q629, 630 2SK104F

G	0V
S	9.5V
D	9.5V

Q615 2SD1010R (or S)

B	0V (10.0V)
C	9.5V
E	0V (9.5V)

Q617 2SD1010R (or S)

B	10.0V (0V)
C	9.5V
E	9.5V (10.2V)

Q627 2SK68AM [2SK163]

G	0V
S	9.5V
D	9.5V

Q613 [D] 2SA772-S (or -T) [NA] 2SB641T

B	17.5V
C	10.0V
E	18.4V

Q611 [D] 2SC1328-S (or -T) [NA] 2SD661T

B	10.6V
C	17.5V
E	10.0V

Q609 2SK30AO

G	9.5V
S	9.5V
D	10.6V

Q607 2SD1010R (or S)

B	10.8V (0V)
B	10.3V
E	10.3V (0V)

IC601, 602 BA651

Pin	V	Pin	V
1	9.9V	8	9.5V
2	9.5V	9	—
3	9.5V	10	9.1V
4	9.5V	11	9.5V
5	9.7V	12	9.5V
6	—	13	9.6V
7	9.5V	14	9.9V

Q635, 636 2SK104F

G	0V
S	9.1V
D	9.1V

Q640 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0.7V (0V)
C	17.4V (0V)
E	0V

Q641 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0.7V (0V)
C	0V (14.0V)
E	0V

Q642 [D] 2SA922-S (or -T) [NA] 2SB641T

B	18.4V (19.0V)
C	19.0V (0V)
E	19.0V

Q643 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0.7V (0V)
C	0V (19.0V)
E	0V

Q638 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0V
C	22.0V
E	0V

Q644 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0V
C	0.7V (0V)
E	0V

Q637 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0V
C	0.6V
E	0V

Q647 [D] 2SA720-R [NA] 2SB644Q (or S)

B	9.9V
C	1.5V
E	9.5V

Q646 [D] 2SC1318-R [NA] 2SD636S

B	9.9V
C	19.0V
E	9.5V

Q645 [D] 2SD880Y (or GR) [NA] 2SC1846R (or S)

B	19.6V
C	27.5V
E	19.0V

Q603 [D] 2SC945-Q (or -P) [NA] 2SC2021SF

B	10.6V
C	19.0V
E	10.2V

Q621 2SK30AO

G	9.6V
S	9.5V
D	10.6V

Q601 2SK104F

G	0V
S	9.4V
D	9.4V

Q605 2SD1010R (or S)

B	0V (10.8V)
C	10.2V
E	10.2V

Q619 [D] 2SC945-Q (or -P) [NA] 2SC2021SF

B	9.8V
C	19.0V
E	9.3V

Q623 [D] 2SC1328-S (or -T) [NA] 2SD661T

B	10.6V
C	17.5V
E	10.0V

Q625 [D] 2SA722-S (or -T) [NA] 2SB641T

B	17.5V
C	10.1V
E	18.0V

Q604 [D] 2SC945-Q (or -P) [NA] 2SC2021SF

B	10.6V
C	19.0V
E	10.2V

Q608 2SD1010R (or S)

B	11.0 V(0V)
C	10.3V
E	10.4V (0V)

Q602 2SK104F

G	0V
S	9.4V
D	9.4V

Q606 2SD1010R (or S)

B	0V (11.0V)
C	9.5V (10.4V)
E	10.3V

Q620 [D] 2SC945-Q (or -P) [NA] 2SC2021SF

B	9.8V
C	19.0V
E	9.4V

Q610 2SK30AO

G	9.5V
S	9.5V
D	10.6V

Q612 [D] 2SC1328-S (or -T) [NA] 2SD661T

B	10.6V
C	17.5V
E	10.0V

Q616 2SD1010R (or S)

B	0V (10.0V)
C	9.5V
E	0V (9.5V)

Q639 [D] 2SC945-Q (or -P) [NA] 2SC2021S

B	0V
C	25.5V (0V)
E	0V

Q618 2SD1010R (or S)

B	10.0V (0V)
C	9.5V
E	9.5V (10.4V)

IC605, 606 NJM4558D

Pin	V
1	10.2V
2	9.5V
3	9.5V
4	—
5	9.2V
6	9.2V
7	9.3V
8	19.0V

Q628 2SK68AM

G	0V
S	9.4V
D	9.3V

Q614 [D] 2SA772-S (or -T) [NA] 2SB641T

B	17.5V
C	10.0V
E	18.4V

IC603, 604 BA652

Pin	V	Pin	V
1	9.8V	8	9.5V
2	9.2V	9	10.0V
3	19.0V	10	9.5V
4	9.2V	11	9.5V
5	10.1V	12	9.5V
6	9.7V	13	9.5V
7	9.5V	14	10.1V

Q626 [D] 2SA722-S (or -T) [NA] 2SB641T

B	17.5V
C	10.1V
E	18.0V

Q622 2SK30AO

G	9.5V
S	9.5V
D	10.6V

Q624 [D] 2SC1328-S (or -T) [NA] 2SD661T

B	10.5V
C	17.5V
E	10.0V

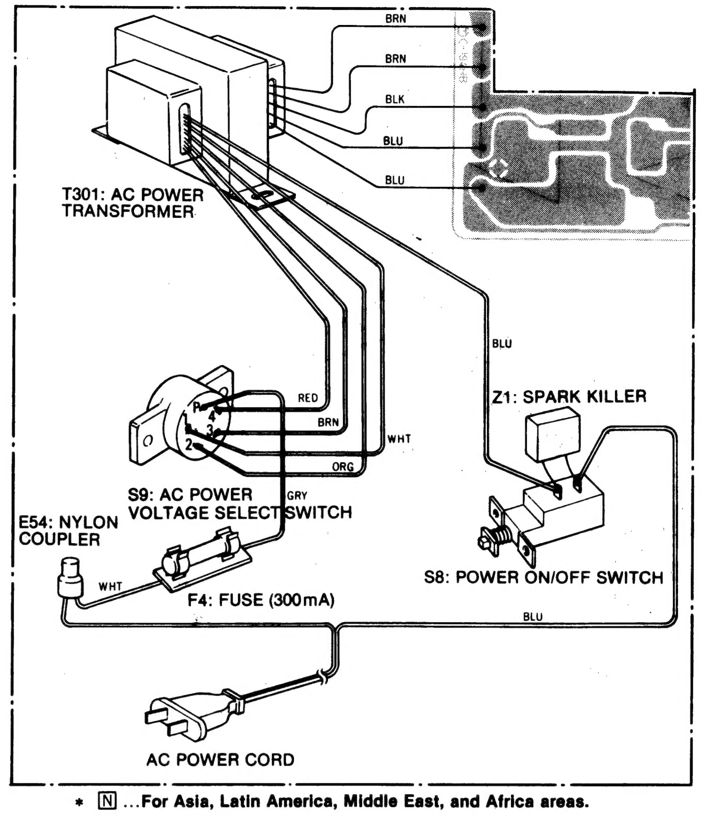
NOTES:

- The circuit shown in ▬ on the conductor is +B (bias: 19V) circuit.
- The circuit shown in ▬ on the conductor is +B (bias: 9.6V) circuit.
- The circuit shown in ▬ on the conductor indicates printed circuit on the back side of the printed circuit board.
- Values indicated in ▭ are under no signal condition and record mode with volume control at minimum position.
  However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode.
  For measurement, use VTVM.

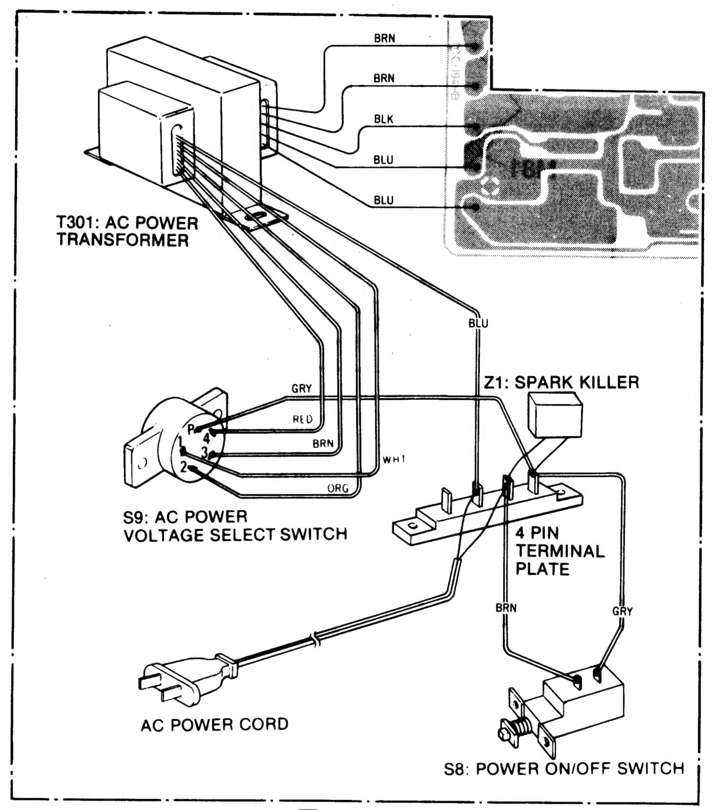
- Described in the circuit board diagram are two types of numbers; the supply parts number and production parts number for transistors.
  One type of number is used for supply parts number and production parts number when the are identical.
  e.g. Q605 — Supply parts number 2SD1010R
  2SD1010R (or S) — Production parts number 2SD1010R or 2SD1010S
- The supply parts number is described alone in the replacement parts list.

WIRING CONNECTION DIAGRAM

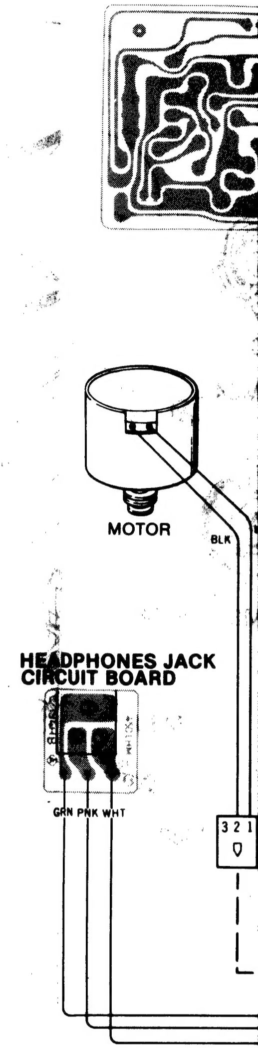
A B C D E F

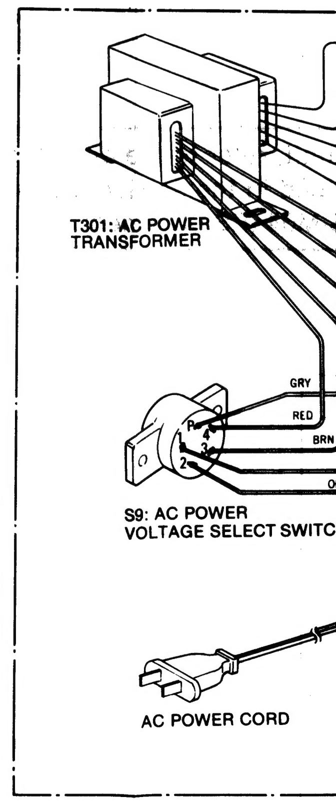


* [N] ...For Asia, Latin America, Middle East, and Africa areas.



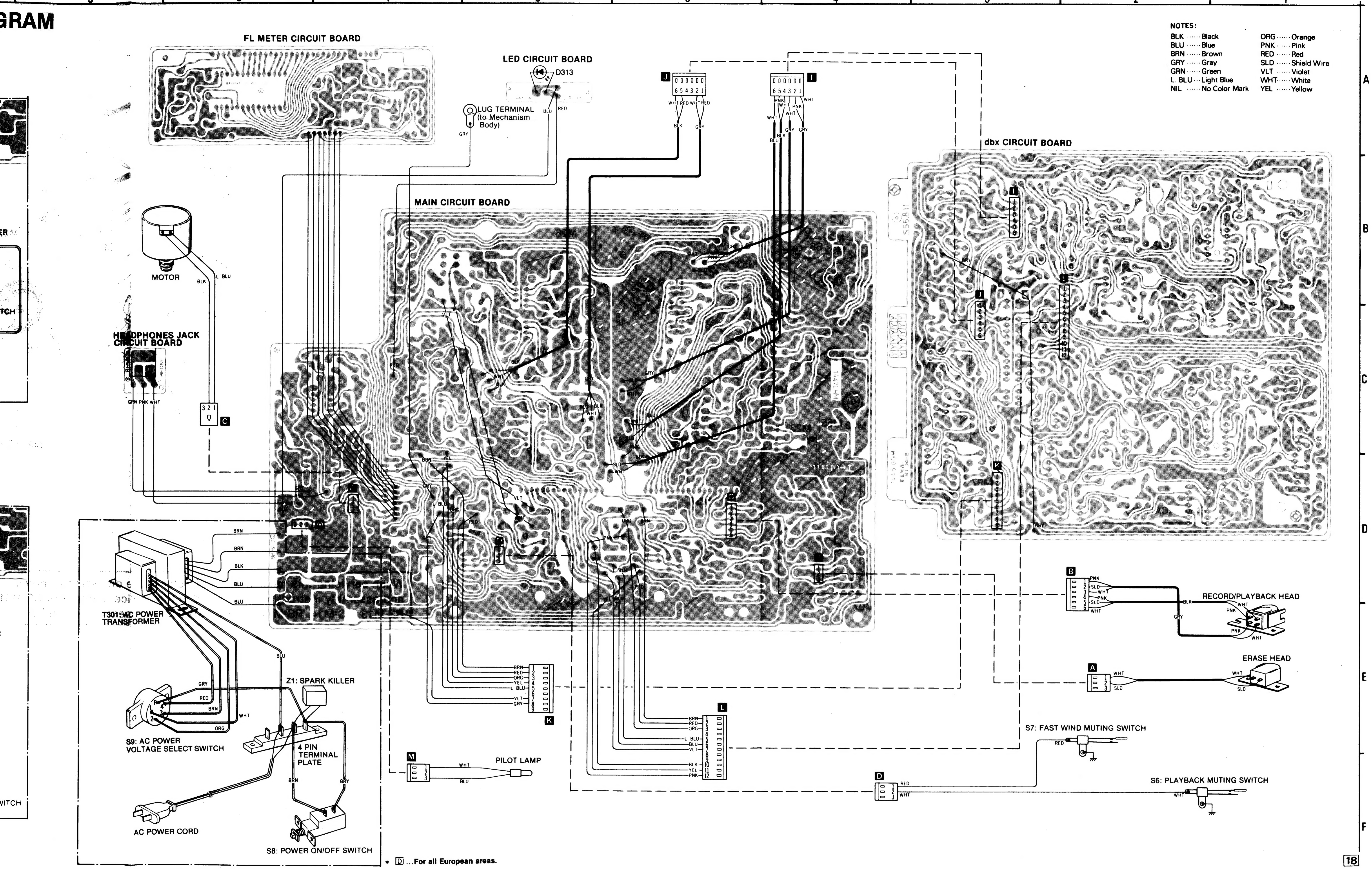
* [A] ...For Australia.





RS-M240X

GRAM



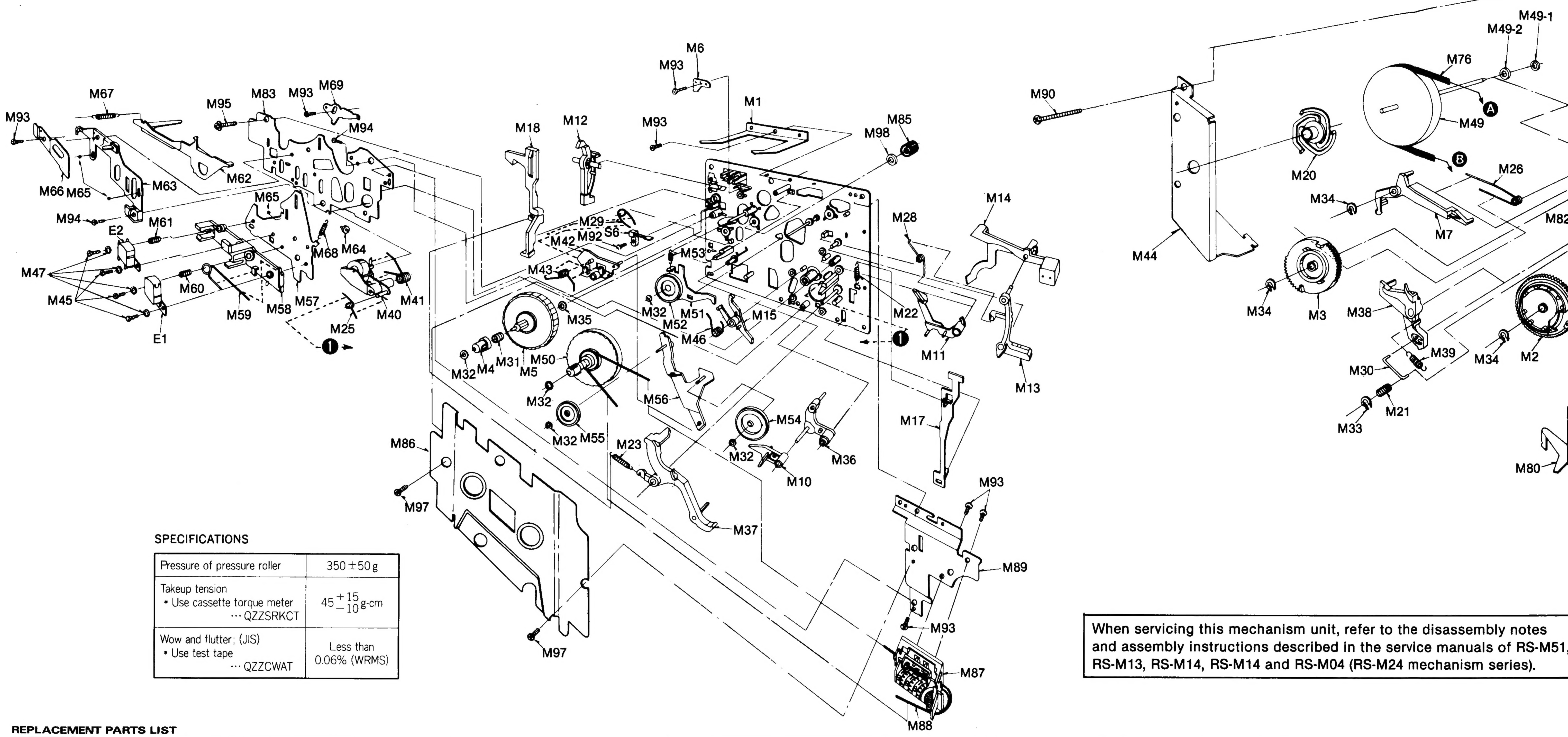
NOTES:

BLK	Black	ORG	Orange
BLU	Blue	PNK	Pink
BRN	Brown	RED	Red
GRY	Gray	SLD	Shield Wire
GRN	Green	VLT	Violet
L. BLU	Light Blue	WHT	White
NIL	No Color Mark	YEL	Yellow

• D ...For all European areas.

RS-M240X

MECHANICAL PARTS LOCATION



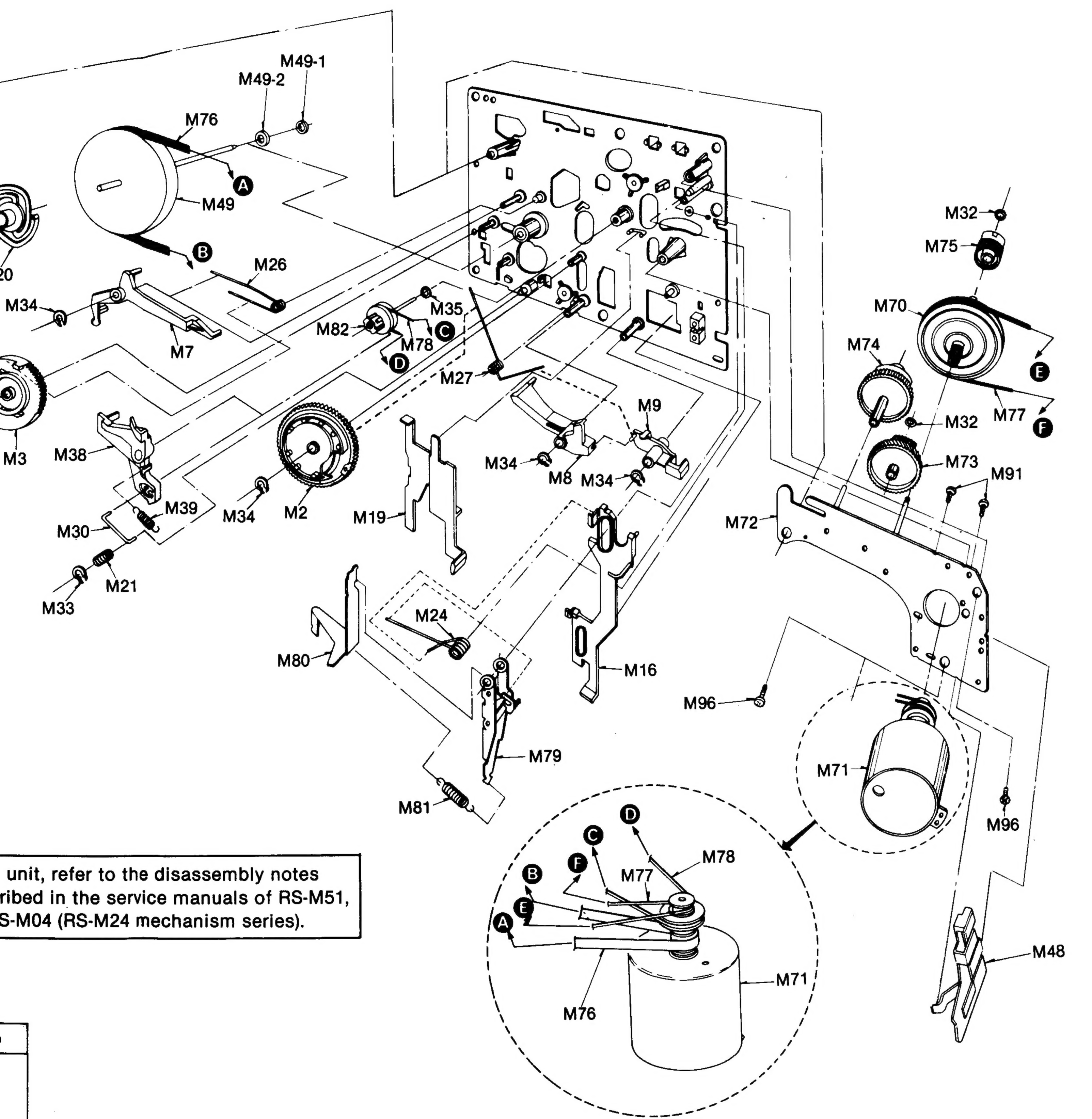
SPECIFICATIONS

Pressure of pressure roller	350±50g
Takeup tension • Use cassette torque meter ···QZZSRKCT	45^{+15}_{-10}g-cm
Wow and flutter; (JIS) • Use test tape ···QZZCWAT	Less than 0.06% (WRMS)

When servicing this mechanism unit, refer to the disassembly notes and assembly instructions described in the service manuals of RS-M51, RS-M13, RS-M14, RS-M14 and RS-M04 (RS-M24 mechanism series).

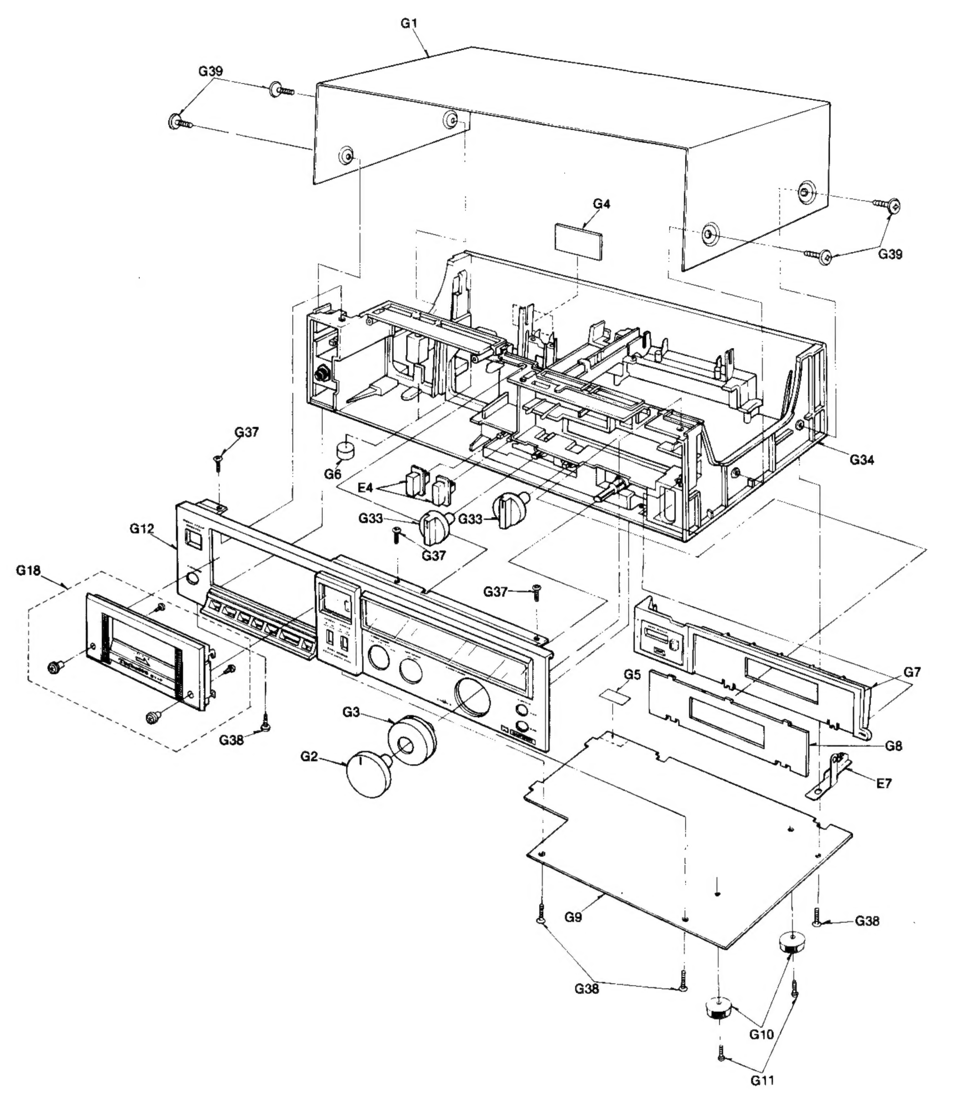
REPLACEMENT PARTS LIST

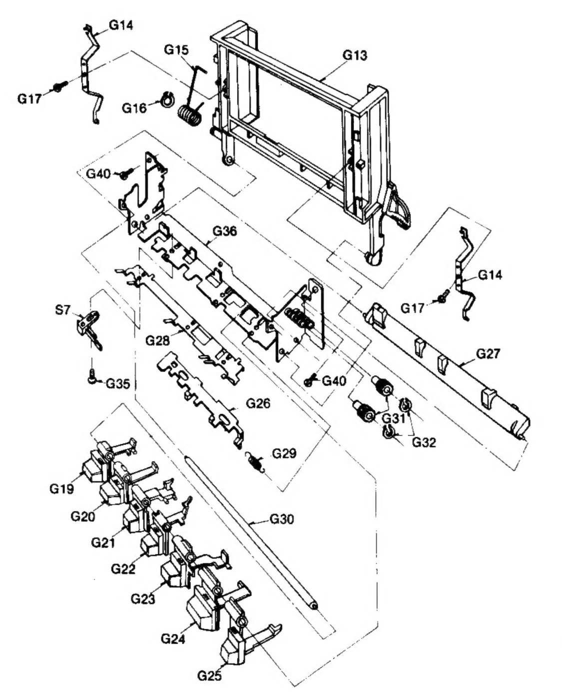
Ref. No.	Part No.	Part Name & Description
	MECHANICAL PARTS	
M1	QBP1874	Cassette Pressure Spring
M2	QDG1201	Main Gear
M3	QDG1202	Sub Gear
M4	QMB1336	Supply Reel Table Hub
M5	QDR1139	Supply Reel Table
M6	QMF2118	Fast Forward Arm Bracket
M7	QML3581	Sub Control Lever
M8	QML3583	Main Control Lever
M9	QML3584	Record Operation Lever
M10	QML3586	Head Base Plate Lift Lever
M11	QML3594	Auto-Stop Release Arm
M12	QML3603	Erase Safety Lever
M13	QML3604	Auto-Stop Driving Lever
M14	QML3605	Auto-Stop Detection Lever
M15	QML3592	Change Lever
M16	QMR1820	Record Rod
M17	QMR1821	Auto-Stop Connection Rod
M18	QMR1822	Eject Rod
M19	QMR1824	Control Rod
M20	QMZ1239	Flywheel Thrust Retainer
M21	QBC1357	Lock Pin Pressure Spring
M22	QBT1682	Auto-Stop Connection Rod Spring
M23	QBT1894	Main Lever Spring
M24	QBN1739	Selection Lever Spring
M25	QBN1742	Pressure Roller Release Spring
M26	QBN1744	Sub Gear Spring
M27	QBN1802	Main Gear Spring
M28	QBN1746	Auto-Stop Lever Spring
M29	QBN1747	Connection Spring
M30	QBS1128	Lock Pin
M31	QBC1372	Reel Table Spring
M32	QBW2008	Poly Washer
M33	XUB4FT	Stop Ring 4φ
M34	XUB3FT	Stop Ring 3φ
M35	QBW2012	Poly Washer
M36	QXL1354	Sub Lever Assembly
M37	QXL1355	Main Lever Assembly
M38	QML3582	Pause Lock Lever
M39	QBT1896	Lever Release Spring
M40	QXL1381	Pressure Roller Assembly
M41	QBN1743	Pressure Roller Spring
M42	QML3588	Fast Forward Lever
M43	QBN1748	Fast Forward Spring
M44	QMA4063	Flywheel Retainer
M45	XSN2+10	Screw ⊕2×10
M46	QBN1741	Change Lever Spring
M47	XWG2	Washer 2φ
M48	QMZ1254	Cord Clamper
M49	QXF0164	Flywheel Assembly
M49-1	QBW2049	Poly Washer
M49-2	QBW2026	Snap Ring
M50	QXD1143	Takeup Reel Table Assembly
M51	QXL1382	Idler Lever Assembly
M52	QXi0111	Takeup Idler Assembly
M53	QBT1893	Takeup Idler Spring
M54	QXi0113	Fast Forward Idler Assembly
M55	QXi0112	Rewind Idler Assembly
M56	QXL1383	Fast Forward Arm Assembly
M57	QMK1840	Head Base Plate
M58	QMZ1241	Head Spacer
M59	QBN1740	Head Pressure Spring
M60	QBC1278	Head Spring
M61	QBCA0008	〃
M62	QML3591	Brake Arm
M63	QMZ1240	Sub Head Base Plate
M64	QMN2550	Roller
M65	QDK1017	Steel Ball 2φ
M66	QBP1873	Head Base Plate Pressure Spring
M67	QBT1597	Brake Arm Spring
M68	QBT1892	Head Release Spring
M69	QMA3858	Head Adjustment Plate
M70	QXG1047	Takeup Gear Assembly
M71	QXU0170	Motor Assembly
M72	QXK2286	Sub Chassis Assembly
M73	QDG1199	Auto-Stop Gear
M74	QDG1200	Cam Gear
M75	QDP1823	Connection Pulley
M76	QDB0281	Capstan Belt
M77	QDB0274	Takeup Belt
M78	QDB0273	Fast Forward Belt
M79	QXL1360	Record/Playback Selection Arm Assembly
M80	QML3580	Record/Playback Selection Lever
M81	QBT1895	Record/Playback Selection Lever Spring
M82	QXP0607	Fast Forward Connection Pulley Assembly
M83	QMK1838	Upper Base Plate
M85	QDP1828	Fast Forward Pulley
M86	QXH0327	Chassis Cover Assembly
M87	QXA1088S	Tape Counter
M88	QDB0240	Counter Belt
M89	QMA3860	Counter Angle
M90	XTN3+24B	Tapping Screw ⊕3×24
M91	XSN26+3	Screw ⊕2.6×3
M92	XTN2+6B	Tapping Screw ⊕2×6
M93	XTN26+6B	Tapping Screw ⊕2.6×6
M94	XTN26+10B	Tapping Screw ⊕2.6×10
M95	XTN26+12B	Tapping Screw ⊕2.6×12
M96	XTN3+10B	Tapping Screw ⊕3×10
M97	XTN26+6BFZ	Tapping Screw ⊕2.6×6
M98	QBW2085	Poly Washer



unit, refer to the disassembly notes
ribed in the service manuals of RS-M51,
S-M04 (RS-M24 mechanism series).

CABINET PARTS LOCATION





REPLACEMENT PARTS LIST

Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Part Name & Description
	CABINET PARTS	
G1	QGC1188S "Silver Type"	Case Cover
	QGC1188K "Black Type"	〃
G2	QYT0623	Volume Knob-A Assembly
G3	QYT0611	Volume Knob-B Assembly
G4 [D]	QGS2917	Main Name Plate
*For all European areas.		
[N]	QGS2909	〃
*For Asia, Latin America, Middle East and Africa areas.		
[A]	QGS2918	〃
*For Australia.		
G5	QBG1691	Rubber Cushion
G6	QKA1081	Rubber Foot-A
G7	QGK3133 "Silver Type"	Meter Cover
	QGK3133K "Black Type"	Meter Cover
G8	QGL1154 "Silver Type"	Meter Filter
	QGL1154Y "Black Type"	〃
G9	QGC1189	Bottom Cover
G10	QKA1083	Rubber Foot-B
G11	QHQ1299	Step Screw
G12	QYP1046 "Silver Type"	Front Panel Assembly
	QYP1047 "Black Type"	〃
G13	QKFM6005K	Cassette Holder
G14	QBP1900	Holder Spring
G15	QBN7008	Lid Spring
G16	XUB5FT	Stop Ring 5φ
G17	XTN26+6BFZ	Tapping Screw ⊕2.6×6
G18	QYF0492 "Silver Type"	Cassette Lid Assembly
	QYF0504 "Black Type"	〃
G19	QXL1441	Eject Button Assembly
G20	QXL1442	Record Button Assembly
G21	QXL1443	Rewind/Review Button Assembly
G22	QXL1444	Fast Forward/Cue Button Assembly
G23	QXL1445	Playback Button Assembly
G24	QXL1446	Stop Button Assembly
G25	QXL1447	Pause Button Assembly
G26	QMR1823	Obstruction Rod
G27	QML3593	Lock Arm
G28	QBP1875	Operation Lever Spring
G29	QBT1597	Obstruction Rod Spring
G30	QMN2554	Operation Lever Shaft
G31	QDG1102	Holder Gear
G32	XUC4FT	Stop Ring 4φ
G33	QGT1495	Select Knob
G34	QKM1466S "Silver Type"	Main Case
	QKM1466K "Black Type"	〃
G35	XTN2+6B	Tapping Screw ⊕2×6
G36	QXA1044	Operation Button Angle Assembly
G37	XTS3+10B	Tapping Screw ⊕3×10
G38	XTN3+10B	〃
G39	XTB4+10BFN "Silver Type"	Screw ⊕4×10
	XTB4+10BFZ "Black Type"	〃
G40	XTN3+10B	Tapping Screw ⊕3×10
	ACCESSORIES	
A1	RP023A	Connection Cord
A2 [D]	QQT3085	Instruction Book
*For all European areas.		
[N]	QQT3087	〃
*For Asia, Latin America, Middle East and Africa areas.		
[A]	QQT3086	〃
*For Australia.		
A3 [N] ⚠	QJP0603S	AC Plug Adaptor
*For Asia, Latin America, Middle East and Africa areas.		
	PACKINGS	
P1 [D]	QPN4184	Inside Carton
*For all European areas.		
[N]	QPN4200	〃
*For Asia, Latin America, Middle East and Africa areas.		
[A]	QPN4199	〃
*For Australia.		
P2	XZB40X60A02	Poly Bag
P3 [D][A]	QPS0434	Pad
*For all European areas and Australia.		
P4	QPC0072	Poly Sheet (for AC Power Cord)
P5	QPC0078	Poly Sheet
P6 [D][N]	QPA0558	Cushion-R
*For all European areas, Asia, Latin America, Middle East and Africa areas.		
[A]	QPA0626	〃
*For Australia.		
P7 [D][N]	QPA0559	Cushion-L
*For all European areas, Asia, Latin America, Middle East and Africa areas.		
[A]	QPA0627	〃
*For Australia.		

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